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CXXI

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BY ALBION REED HODGDON

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Pages 29–69 and Plate 488.....5 February, 1938
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A TAXONOMIC STUDY OF LECHEA

ALBION R. HODGDON

(Plates 488–491)

LINNAEUS[1] had in his genus *Lechea* two species, *L. minor* and *L. major*. The type of the latter has long been known to belong to *Helianthemum*. The description of *L. minor* is generalized and that name is given in the Linnean Herbarium to specimens of several species. The specimen selected as the type by Britton[2] was the one labeled "*Capraria fol. integerrimis, fl. virg.*", this being the name given by Gronovius to one of the plants cited by Linnaeus.

Michaux[3] described three new species, two of which, *Lechea racemulosa* and *L. tenuifolia*, still stand. The other was *L. thymifolia*, the plant we now call *L. minor*. The *L. minor* of Michaux and most later authors, until Britton, included several of our northeastern species. Poiret[4] largely followed Michaux, except for the inclusion of *L. verticillata* and *L. chinensis* (two plants of the orient quite unrelated to *Lechea* as now interpreted) and the elimination of *L. minor*. Of *L. thymifolia* Michx. Poiret states, "Il est à presumer, mais sans une certitude absolue, que cette plante est le *Lechea minor* de Linné." Pursh[5] followed Linnaeus and Michaux in regard to names but, whereas the latter's *L. thymifolia* is our *L. minor*, that of Pursh is our *L.*

[1] Sp. Pl. 90 (1753).
[2] Bull. Torr. Bot. Cl. xxi. 247 (1894).
[3] Fl. Bor.-Am. i. 76, 77 (1803).
[4] Encyc. Meth. Suppl. iii. 340, 341 (1813).
[5] Fl. Am. Sept. i. 90 (1814).

maritima. This conclusion is largely arrived at through the examination of types which, in the case of the older species, have been seen by Britton.[1] The early descriptions are generally inadequate and generalized as are the early drawings. Elliott[2] gave the name *L. villosa* to the plant which had until then been called *L. major.* He pointed out the fact that the *L. major* of Linnaeus was a *Helianthemum.* The other species recognized by Elliott were *L. racemulosa, L. tenuifolia* and *L. thymifolia,* the last of which, by the description, is our *L. minor.* Smith[3] interpreted the Linnean *L. minor* to be the plant we call *L. villosa.* He followed Elliott in ruling out the *L. major* of Linnaeus. Otherwise he followed Michaux, except that he included the unrelated *L. verticillata.* Dunal[4] used the name *L. villosa* of Elliott in place of *L. major.* He otherwise too largely followed Michaux, except that his concept of *L. thymifolia* was partly that of Pursh. The American authors of the first half of the 19th century, except Torrey and Rafinesque, largely accepted Michaux's species and, in fact, mostly borrowed literally from his work or from that of Pursh. Torrey,[5] in 1824 recognized four species, *L. major* L., *L. minor* L., *L. racemulosa* Michx. and *L. thymifolia* Pursh.

Rafinesque's monograph of *Lechea*[6] is an interesting but entirely perplexing piece of work. In it Rafinesque first stressed the value of the length of the "external calix" in relation to the internal, also the importance of the number of seeds per capsule. The number of stamens, he believed, was still another valuable character and perhaps this view was in part responsible for the deplorable state in which he left the genus. He made three subgenera.

1. "Menandra, Fl. Virg. of Gronovius. External calix with 2 short sepals or almost lacking. Stamens 6 to 9, seeds 1 to 3. *Leaves often ternate, and flowers racemose. Perennials.*" 2. "Lechea, Ext. calix equal in length to the internal. Stamens 6 to 12, seeds 1 to 3, *flowers spicate, paniculate, some stems sterile.*" 3. "Eudiexa Raf. (well 2 external) Ext. calix longer than the internal. Stamens 3 to 6. Seeds 3 to 9. Chiefly annuals."

Rafinesque thereupon proceeded to describe 21 species (20 of them new), only four of which I have been able to correlate definitely with any known species. It is apparent that he could not discriminate in

[1] Bull. Torr. Bot. Cl. xxi. 245 (1894).
[2] Sk. Bot. S. Car. and Ga. 184 (1816).
[3] Rees's Cycl. 20 (1819).
[4] DC. Prod. i. 285 (1824).
[5] Fl. N. and Mid. St. i. 160, 161 (1824).
[6] New Fl. N. Am. i. 89–98 (1836).

value between those characters which he stated to be important and those which we know to vary with external conditions.

Spach[1] treated *Lechea villosa* as *L. Drummondii*, believing it to have been hitherto undescribed, and *L. tenuifolia* as *L. thesioides*, believing that to be a new species. Furthermore he made an entirely new genus *Lechidium* to include a remarkably distinct species from Texas, which he named *Lechidium Drummondii*.

Torrey and Gray[2] had two varieties, α and β., of their *Lechea minor*. Their concept included *L. racemulosa* Michx., *L. thymifolia* Michx. (our *L. minor* L. probably), and *L. tenuifolia* Michx. Their *L. thymifolia* is the plant we call *L. maritima*, rather than the plant to which Pursh had given the name. They made the new combination *Lechea Drummondii* of Spach's *Lechidium Drummondii*, overlooking the fact that there was already a *Lechea Drummondii* published by that author. Torrey[3] in 1843 recognized three species, *L. minor* having two named varieties 1. *dumosa*, 2. *gracilis*, which were *L. tenuifolia* and *L. racemulosa* respectively.

For a period of thirty years or more after Torrey's Flora of the State of New York appeared, there was very little published on the genus. Gray satisfied himself in the first four editions of the Manual with recognizing three species, those of Torrey & Gray's Flora excepting *Lechea Drummondii*. In 1867 we find him[4] publishing for the first time the name *L. novae-caesareae* Austin for our *L. minor* L.

In 1878 there appeared a discussion of Rafinesque's Monograph by W. H. Leggett.[5] On pages 251 and 252 he published the first lucid key that had yet appeared, making use of the better of Rafinesque's characters and stressing, in particular, the proportions of the basal leaves. Here were described *Lechea patula* and *L. cubensis* for the first time. Leggett pointed out that *L. thymifolia* of the early editions of Gray's Manual must receive another name. He also showed that the so-called *L. minor* Lam. did not properly include *L. racemulosa*, *L. tenuifolia* and *L. thymifolia* but did cover one or more previously undefined species of the northeastern United States. In all, Leggett recognized ten species and several variants which, however, he did not name. He pointed out the weaknesses and effective

[1] Hook. Comp. Bot. Mag. ii. 282–289 (1837).
[2] Fl. N. Am. i. 153, 154 (1838).
[3] Fl. N. Y. i. 78, 79 (1843).
[4] Gray's Man. ed. 5: 81 (1867).
[5] Bull. Torr. Bot. Cl. vi. 246–252 (1878).

points of Rafinesque's work and noted the difficulties involved in recognizing his species. This treatment brought Leggett recognition as the outstanding student of the genus for several years. He published little but before his death in 1882 he had gone over with Britton[1] Rafinesque's study on the group and had given tentative names to many new species.

Gray's (or perhaps Watson's)[2] views on the species within the manual-range appeared in 1890. Here were included *Lechea major*, *L. tenuifolia*, *L. racemulosa*, *L. minor* and *L. minor* var. *maritima*.

Chapman[3] published *Lechea cinerea* Raf. and *L. cinerea* var. *Torreyi*, one of the first of the complexes of a species and its variety to be satisfactorily treated. It was with Leggett's work as a basis that Britton[4] in 1894 published his monograph, the most penetrating piece of work to appear on the genus. The following species were here described for the first time but were attributed to Leggett, *L. intermedia*, *L. Torreyi*, *L. stricta* and *L. divaricata*. The new combination *L. tripetala* (Moc. & Sess.) Britton was made. The name *L. maritima* for *L. thymifolia* Pursh was established and the species *L. Leggettii* was given clear delineation. Altogether fourteen species were described but no varieties were recognized.

Robinson's treatment,[5] generally speaking, was a scholarly piece of work but technically based largely on Britton's monograph, as is stated in a footnote.[6] It included only the species of the United States and Canada (11 in all) and consequently omitted *Lechea cubensis* and *L. tripetala*. Chiefly on the basis of type of pubescence he chose, following Gray, to make the very distinct *L. divaricata* a variety of *L. villosa*. Unlike Britton, he retained the subgenus *Lechidium*.

Bicknell[7] described *Lechea juniperina* from the coast of Maine. This was included in the treatment of the genus by Britton and Brown.[8] In the latter work are descriptions of nine species accompanied by figures showing the panicles, basal shoots, capsules and calyces. The illustrations in common with all those of the genus

[1] Bull. Torr. Bot. Cl. xxi. 245 (1894).
[2] Gray, Man. ed. 6: 77, 78 (1890).
[3] Fl. S. U. S. ed. 2, Suppl. 2: 678 (1892).
[4] Bull. Torr. Bot. Cl. xxi. 244–253 (1894).
[5] Syn. Fl. N. Am. i[1] 192–194 (1895).
[6] Syn Fl. N. Am. l. c., 192 (1895).
[7] Bull. Torr. Bot. Cl. xxiv. 88 (1897).
[8] Ill. Fl. ed. 1, ii. 441–444 (1897).

except in Gray's Genera[1] are crude and frequently inexact. The basal leaves of *L. intermedia* in Britton & Brown are shown to be as broad proportionally as those of *L. maritima*, whereas, in the description they are given as 4″–5″ long, ½″ wide for the former and 3″–4″ long, 1½″–2″ wide for the latter. Actually they are of about equal proportions in both and more than three times as long as broad and not, as stated in the key for *L. maritima*, "Leaves of the basal shoots oblong or ovate, not more than three times as long as broad." Britton's latest exposition of the genus,[2] in 1901, was largely that of his earlier works except for the inclusion of Bicknell's *L. moniliformis*, published for the first time.

The most recent work on *Lechea* in its entirety is that of Grosser.[3] It has more complete citations of specimens and literature than any previous work. The author retains the name *L. major* for *L. villosa* and makes of it two varieties, var. α. *villosa* and var. β. *divaricata*. He maintains *Lechidium* as a section and includes in it the species *L. san-sabeana*. There are thirteen species taken up in this work.

Small[4] included *Lechea maritima* among the ten species recognized within the range of his Flora; but as far as I have found it does not occur south of Virginia. The very distinct *L. Drummondii* was not placed in a separate subsection or subgenus. Generally speaking his treatment of 1903 was sane and conservative.

Robinson and Fernald[5] maintain eight species in the manual-range. *Lechea juniperina* is reduced by Robinson to the status of a variety and *L. moniliformis* is cited as a synonym of *L. Leggettii*. Robinson describes *L. maritima* var. *interior* which tends to confuse rather than clarify that particular complex.

Small's recent treatment[6] is a very radical piece of work. In the first place, of the fourteen species there appearing five are of his own making. These are *Lechea cernua*, *L. exserta*, *L. myriophylla*, *L. prismatica* and *L. Deckertii*, the first and last named of which were published earlier and are satisfactory species. The three remaining were there described for the first time. *L. prismatica* and *L. exserta* I include with *L. patula*, *L. myriophylla* with *L. Deckertii*. Small makes five sections: I. *Longisepalae*, with five species; II. *Brevisepalae*,

[1] Genera Ill. i. 205, 206, pls. 88 and 89 (1848).
[2] Man. ed. 1: 631–633 (1901).
[3] Engler, Pflanzenr. iv[193]. 133–140 (1903).
[4] Fl. Se. U. S. 798, 799 (1903).
[5] Gray's Man. ed. 7: 577–579 (1908).
[6] Man. 881–884 (1933).

with four species; III. *Cernuae*, with one species; IV. *Divaricatae*, with one species; V. *Myriophyllae*, with two species. *L. prismatica* is placed by Small in the *Longisepalae*, *L. exserta* in the *Brevisepalae;* yet, I consider both of these forms of *L. patula* which he places in the *Longisepalae*. In his work no varieties are recognized.

Plants of *Lechea* are generally perennial but they are frequently biennial in the northern United States and in Canada or they may fruit on abbreviated stems at the end of the first season. In the South, generally, the plants are strongly perennial to suffruticose. The same species, *L. villosa* var. *typica* for example, may in the North be biennial, with a virtually unbranched caudex, and in the South become strongly perennial, with a greatly branched caudex. Generally speaking, however, the suffruticose habit is confined to several very distinct subtropical species and the biennial nature appears where winters are severe.

The ROOTS offer no characters of importance. They are very crooked, with short stout branches and are essentially similar throughout the genus.

The BASAL SHOOTS are of particular interest and importance. They are called by Britton[1] "sterile radical shoots"; Grosser[2] calls them "rami steriles basales." They have been spoken of mostly as basal shoots and I shall so call them in this paper. In the suffruticose species, *Lechea Deckertii*, *L. tripetala* and *L. cubensis*, they are wanting. The new shoots appear sporadically as branches in such cases. *L. patula*, *L. divaricata* and *L. villosa* in the southern part of their ranges all have an extensive branching caudex. In the season of vegetative development the new shoots appear from any part of the caudex but frequently from towards its base. Except that they undergo no rest-period they are quite comparable to the basal shoots of the northern species, which branch from all sides of the contracted caudex, forming a rosette. They develop from late in August until late in November, the time of appearance depending in part on the species and partly on the maturity of individuals. Basal shoots persist for many months at a certain stage of development which appears to be definite for each species. They offer one of the most certain means of identifying the species in which they undergo a definite period of dormancy.

The BASAL LEAVES (the leaves of the basal shoots) are crowded and

[1] Bull. Torr. Bot. Cl. xxi. 246 (1894).
[2] Engler, Pflanzenr. iv[133]. 137 (1903).

strongly reduced in size. In quality and quantity of pubescence they are similar to the very mature cauline leaves. The basal leaves are more reduced in length than in breadth, making them proportionately broader than the cauline. Generally they are simple but in *Lechea villosa* var. *typica* and in *L. tenuifolia* (particularly in the latter) they are branched.

The FRUITING STEM results either from the renewed growth of the simple basal shoots or from one of its branches, when they occur. The transition from basal shoots to fruiting stems is abrupt in the North except in one or two instances, notably *Lechea intermedia* var. *depauperata* of the Lake Athabasca region, which is growing in a climate so much more severe than ours that comparison of its manner of growth with that of our species is difficult. In the broad-leaved species (comparatively speaking) of Florida we find the most complicated series of growth-stages. The new branches may be from the base or above, on the caudex, and may or may not have undergone dormancy; but in either instance they are related morphologically to basal shoots. *L. patula* illustrates the complexity of growth. The dormant shoots are frequently simple and have small narrowly elliptic-oblong leaves. During development which, in suffruticose types such as this, is very slow, the shoots become much branched and bear much larger leaves but otherwise simulate the resting condition. The mature fruiting stems have a still different type of leaf, narrower and less densely pilose.

The PUBESCENCE in the genus is all of one kind. Solereder[1] describes the peculiar falsely bicellular hair which he states is well known also in the *Combretaceae*. Kearney[2] figures a hair of this nature from *Lechea maritima*. It is presumably the only kind that he observed since he describes this type as characteristic and mentions no other. In my own observations on the genus I have seen no stellate or glandular hairs nor in fact any but a uniform type. Janchen[3] states that the "Deckhaare" are "einfach." Kearney, l. c. p. 498, describes three types of hairs for *Helianthemum*, the type mentioned above as well as stellate, pluricellular and multicellular, glandular hairs. Of *Hudsonia*, however, Kearney, l. c., referring to the peculiar hairs of *Lechea*, states, "Hairs similar to those just described form the dense covering of the leaves of *Hudsonia tomentosa*.

[1] System. Anat. 91 (1899).
[2] Contrib. U. S. Nat Herb. (Bot. Dismal Swamp Region, 497) v. 497 (1901).
[3] Engler & Prantl, Nat. Pflanzenfam. ii[21]. 301 (1925).

The DISPOSITION OF THE PUBESCENCE, particularly on the leaves, is rather complicated and of considerable value taxonomically. The species *Lechea cernua* and *L. villosa* display the greatest extent of pilosity. All leaves of the former are strongly pilose to tomentose above and below. *L. villosa* var. *Schaffneri* from Mexico is likewise strongly pilose on both leaf-surfaces. The southern subshrubby plants of *L. villosa* var. *typica* also bear leaves which are strongly pilose above. The upper surfaces of leaves of northern *L. villosa* var. *typica* are usually only slightly pilose. In this species the basal shoots, when well developed, bear leaves which are glabrous above. When hairs occur on the upper surface they are scattered over the entire surface. On the lower surface they may be distributed generally but in such cases are more concentrated on the midrib and the margin. In the larger number of species they are confined to the midrib and the margin. *L. villosa* and to a less extent *L. maritima* display most of the degrees of pubescence during their development.

The QUALITY OF PUBESCENCE varies somewhat. The hairs are short and decidedly appressed in *Lechea intermedia;* they are long and spreading in *L. villosa.* Various intermediate types occur between the two. Buds, young shoots and branches are always strongly or densely pilose or tomentose to villous.

The SIZE OF THE PLANT differs considerably in the various species and varieties. *Lechea intermedia* var. *depauperata* has semiprostrate fruiting stems a few cm. long. *L. Leggettii* var. *ramosissima* may be 80 or more cm. in height. The branches may be broadly, at times horizontally spreading, forming a loose globose panicle, as in the last named variety, or suberect and contracted into a dense spire-shaped panicle, as in *L. stricta.* In general the shape of the panicle may vary considerably within certain limits.

The ARRANGEMENT OF THE FRUITS is a fairly definite character for each species or variety. *Lechea villosa* var. *typica,* for example, has fruits in crowded heads. The pedicels, which are short, are appressed to strongly spreading or reflexed in relation to the axis, in this way allowing a maximum amount of concentration on the short fruiting branches. The disposition of the fruits undergoes considerable modification within species in different geographic areas. Thus, the northeastern and inland *L. Leggettii* var. *typica* usually has the fruits definitely crowded at the top of the fruiting branches. Var. *monili-formis* of the northern Coastal Plain and the Great Lakes region has

them predominantly evenly distributed, or nearly so, on much longer branches; while var. *ramosissima* of the southern Coastal Plain has them evenly distributed but scattered on very long fruiting branches. *L. Torreyi* has the fruits racemose and mostly evenly distributed on but slightly crooked branches, whereas var. *congesta* has short and very crooked fruiting branches which bear the fruits in close racemes or clusters. At least two special examples of fruit-arrangement are worthy of brief mention here. *L. cernua* has the fruits in clusters of a few each. They are not crowded but, nevertheless, are appressed, spreading or reflexed upon the axis in a peculiar manner certainly suggesting the position of the pedicels in the crowded clusters of *L. villosa* for example. *L. san-sabeana* of the subgenus *Lechidium* has its fruits strongly secund and widely scattered on the very long branches and borne at right angles to the axis on very long pedicels.

The FRUITS offer the best characters for taxonomic study. The slight differences, however, in shape and size of calyx-parts, capsules and seeds make it difficult for one to describe distinctions which actually exist and are, furthermore, very apparent to a student of the genus. The differences are slight, not only between species and varieties but between true species and also between groups of species. For example: a rather fundamental character in the genus is the shape of the calyx, whether it is broader toward the base than above or whether it is broader toward the tip or above the middle and narrows in one way or other toward the base. Four species, which in other respects have striking similarities, have the calyx distinctly broadest below the middle and toward the base. These are *Lechea san-sabeana*, *L. tenuifolia*, *L. mensalis* and *L. tripetala*. The calyces of the other species, while broadly globose at times, have an obconic base merging into the pedicel. Generally these species have pyriform or cuneate-obovoid to cuneate-globose fruits.

The CALYX is composed of five sepals in two very dissimilar series, an outer two which are bracteole-like and an inner three constituting the prominent calyx. That the outer two are sepals and not bracteoles is stated by Grosser[1] "Die beiden äusseren . . . sind von manchen Autoren als Vorblätter gedeutet worden, eine Ansicht, deren Richtigkeit stark in Zweifel gestellt wird einerseits durch das Vorhandensein eigentlicher Vorblätter, andrerseits durch die bisweilen mächtige Entwickelung der äusseren Kelchblätter, wie bei

[1] Engler, Pflanzenr. iv[103]. 5 (1903).

einigen Arten von *Cistus* und *Tuberaria*, wodurch sich dieselben als echte Bestandteile des Kelches zu erkennen geben." Much the same interpretation is given by Janchen[1] more recently in his discussion of the group. In *Lechea* the outer sepals are always much narrower but may be either longer or shorter than the inner. Usually the outer are greener and more leaf-like than the inner. In the narrow-leaved species with long exterior sepals, *L. san-sabeana* and *L. tenuifolia* for example, the small upper cauline leaves strikingly resemble these structures. The four species of *Lechea* which have calyces broadest near the base also have exterior sepals equaling to considerably exceeding the inner. The remaining species, except *L. patula*, *L. villosa* and *L. minor*, which possess relatively broad leaves in addition to long exterior sepals, have these from minute and hardly obvious to slightly shorter than the inner.

The CAPSULES are broadly ovoid and broadest toward the base in *Lechea tenuifolia* and its relatives (mentioned above), thus conforming to the shape of the calyx. The capsule is usually about equal to or slightly exceeded by the calyx but in three species, *L. divaricata*, *L. Deckertii* and *L. patula*, the capsule is much longer than the calyx. The first two have globose capsules; *L. patula* has them narrowly ovoid. A characteristic of several species is the fact that the three valves are somewhat or completely united. In the majority of species, the valves in maturity become separate to the base and hence are easily removed. The valves of *L. cernua* are united about to the middle. Those of *L. divaricata* and *L. Deckertii* are entirely grown together. The first two species have the wall of the capsule indurated; in the last named the wall is papery. The placentae and dissepiments, which in several species tend to become prominent, in *L. san-sabeana* become permanent structures in the capsule.

The SEEDS are of diverse form and number. For each species or variety they are fairly constant in shape, size and number per capsule. Depending on the number in the capsule, they are equilateral and dorsi-ventrally compressed if 2; irregularly ovoid if 1; of various shapes if 3; and 3-sided and tending to be equilateral, with two nearly flat subequal faces meeting in a sharp keel, when the number is 4 to 6. The shape of capsule characteristic of certain species determines to a lesser extent the form of the seeds. There are several species each having 1, 2, 3 and 4–6 seeds. The chief value of the seed-char-

[1] Engler & Prantl, Nat. Pflanzenfam. iii[2]. 295 (1925).

acters rests upon the fact that some species, which are otherwise difficult to separate, are easily distinguishable by their seed-differences. The seeds of several species are marked by certain peculiarities. *Lechea intermedia* has the mature seeds with a delicate covering which adheres in places resulting in a reticulate surface. Two other species, *L. divaricata* and *L. cernua*, have in maturity a non-reticulate membranaceous coat. *L. villosa* has very lustrous seeds possessing an almost transparent endosperm, thus allowing the embryo to be conspicuous. *L. tenuifolia* and *L. maritima* have light- to medium-brown dull (non-lustrous) seeds wherein the embryo may easily be noted. The remaining species have mostly dark-brown seeds with the embryo not apparent.

The FLOWERS of *Lechea* are of very minor value in classification. The flowering of *L. maritima* was considered by Leggett[1] so unusual that he specially mentioned the phenomenon. Britton[2] states "All the Lecheas which I have been able to examine in the field bloom very shyly and the whole plant appears to come into flower at the same time. This occurs in bright sunshine, the petals are fugacious and thus the flowers are of but little practical value in classification." I have studied the two common species, *L. intermedia* and *L. maritima*, intensively in the field during the summer and autumn but I have never seen either with fully expanded flowers. The scattered specimens in flower from the several herbaria represented in this study show that in some species the number of stamens (the floral organs most likely to yield diagnostic characters) in the flowers, even on the same plant, is very variable. *L. divaricata* has from 15 to 25 (perhaps more). *L. patula*, on the contrary, has an average of perhaps 6. *L. intermedia* has from 12 to 17. Other species are equally variable in the number of stamens and greatly overlap, indicating that this character has but little diagnostic value.

Kearney[3] states that *Lechea maritima* may be "safely referred to" as being self-fertilized. If the amount of seeming hybridization between species is an indication of the nature of pollination, *L. maritima* must certainly be to a considerable extent cross-fertilized in one way or another. I have seen probable hybrids of *L. maritima* and *L. minor* from Nantucket and Chappaquiddick Islands collected by Bicknell. *L. villosa* rather frequently hybridizes with *L. maritima*.

[1] Bull. Torr. Bot. Cl. viii. 116 (1881).
[2] Bull. Torr. Bot. Cl. xxi. 246 (1894).
[3] Contrib. U. S. Nat. Herb. (Bot. Dismal Swamp Region) v. 393 (1901).

Bicknell had a specimen from Chappaquiddick Island and Mrs. C. M. Carr has collected it in Sudbury, Massachusetts. In Concord, Massachusetts, during the autumn of 1934, I saw numerous intermediates between *L. villosa* and *L. maritima* growing with these species at the edge of a field. Besides these pronounced probable hybrids, I have seen dried specimens of similar character between *L. maritima* and *L. Leggettii* and between *L. maritima* and *L. intermedia*. They are frequently difficult to detect because of the close resemblance of the parents.

The genus *Lechea* is the most distinctive of the several genera in the *Cistaceae*. Hutchinson,[1] in his description of the family, states the characters (several of which are not found in *Lechea*): "Herbs or shrubs, often with *stellate* indumentum; leaves *opposite* or rarely alternate, simple; stipules present or adnate to the petiole; flowers ☿ actinomorphic, solitary to cymose, showy; sepals 3–5, *contorted;* petals 5 to 0, *contorted*, very soon falling off; stamens *numerous*, hypogynous; . . . style simple with 3–5 free or united stigmas; . . . seeds with endosperm and bent, coiled or folded embryo." Grosser[2] in his key to the *Cistaceae* correctly separates *Lechea* from the remainder of the family by attributing to it "Petala 3, persistentia. Aestivatio imbricata." The hairs are simple and falsely bicellular, not stellate (see discussion above). The leaves are alternate, without visible signs of stipules. The flowers are minute and about as conspicuous as those of a *Juncus*, though much more rarely seen. The sepals are 5 and are scarcely, or not at all, contorted. The petals are 3 and, as correctly stated by Grosser, imbricated and persistent. The stamens are in perhaps half of the species less than 8 or 10. The stigma is entirely sessile and strikingly plumose, thus differing from most members of the family, in which it is discoid or hemispherical. Of the three North American genera of the *Cistaceae*, *Lechea* is farthest removed from the more typical Old World genera.

What I believe to be the true relationship of most of the species follows in general the principal headings within the key. *Lechea san-sabeana*, distinct enough to warrant its being placed in the subgenus *Lechidium*, is most closely related to the narrow-leaved *L. tenuifolia* and *L. tripetala*. These, in turn, appear to be nearer the broad-leaved *L. villosa* and only remotely connected with the narrow-

[1] Fam. of Fl. Pl. Dicotyledons, 162, 163 (1926).
[2] Engler, Pflanzenr. iv[193]. 10 (1903).

leaved southeastern Lecheas. The change from broad to narrow leaves is surely less fundamental than differences in reproductive structures. There is no evidence to show, however, that *L. tenuifolia* or any other narrow-leaved species ever tends to produce any but narrow leaves in whatever climate it grows. *L. villosa* var. *Schaffneri*, on the other hand, of semi-arid mountains of Mexico is distinguished from the broad-leaved var. *typica* of the more northern and less arid habitats by its much narrower leaves. In general it appears that a species like *L. villosa* (var. *typica*) with broad leaves, which have hairs both above and below, with basal leaves much like the cauline or perhaps lacking, with fairly prominent exterior sepals and several seeds (3 or more) represents a type from which most of the other species might have been derived. Beyond saying that the eastern species, *L. minor*, *L. racemulosa*, *L. patula*, *L. Leggettii* and *L. Torreyi* are definitely related, I hesitate to say more of relationship for want of definite facts.

Geographical Distribution

The *Cistaceae* as a family are found in North and South America, Europe, western Asia and northern Africa. There are but few species in Asia and South America. The strongest concentration of species is in the Iberian Peninsula and in that part of North America known as the Atlantic Coastal Plain, a range which may well indicate a considerable antiquity for the family as a whole. Fernald,[1] in speaking of areas having distinct and restricted floras, states "Again, can it be that the antiquity of the Iberian tableland, essentially undisturbed since the dawn of angiosperms, has nothing to do with the occurrence there of 800 endemics?" Many characteristic elements in the flora of the Coastal Plain have been shown to be ancient, because of their close relationships only with groups in remote parts of the world.

The facts that *Hudsonia* and *Lechea* are very distinct from the European genera of the family and that our third genus, although long referred to *Helianthemum*, is so different from the European and typical species of that genus that some recent authors, Britton,[2] Janchen[3] and Small,[4] regard it as generically distinct, demonstrate that the period when the family was connected in some manner between the two areas was remote.

[1] Quarterly Review of Biol. i. 233 (1926).
[2] Britton & Brown, Ill. Fl. ed. 2, ii. 539 (1913).
[3] Engler & Prantl, Nat. Pflanzenfam. ii[31]. 305 (1925).
[4] Small, Man. 878 (1933).

Confining our attentions to *Lechea*, we may note several interesting points in its distribution:

1. The occurrence in Florida, Cuba and Texas of five species having definitely localized range. Two, *Lechea cernua* and *L. divaricata*, are confined to central Florida; two others, *L. san-sabeana* and *L. mensalis*, are confined to Texas, the former to the eastern half of the state, the latter to a single station in the Chisos Mountains, where many local endemics occur; one, *L. cubensis*, is known only from a single locality in the western part of Cuba. Furthermore, two more species are in part or chiefly confined to Florida, *L. Torreyi* var. *typica*, which is restricted to that state, and *L. Deckertii* which, except for one station in southern Georgia, does not get out of its confines. In distribution, as in morphological structure which has been discussed for most of the species, the highly localized species may be considered to be in a stage of maturity or old age. It is a rather striking contradiction of the Age and Area hypothesis of Willis that the above named very specialized species, which are so distinct that in several instances their kinship in the genus is only to be guessed at, have strikingly restricted ranges.

2. The obvious sharing of range of several species between the Coastal Plain and the Appalachian Upland. Fernald[1] has discussed this relationship rather completely in his paper "*Specific Segregation and Identities in some Floras of eastern North America and the Old World.*" The conclusion seems to be tenable that the groups which are characteristic of the present youthful Coastal Plain but in major part are very old persisted during the vicissitudes of the Tertiary on the very ancient area of the Appalachian Upland. *Lechea minor* and *L. racemulosa*, which are stable and very distinct species, are strikingly common on the Coastal Plain and likewise abundant in the mountains, *L. minor* in western North Carolina, eastern Tennessee and eastern Kentucky, *L. racemulosa* along the whole Appalachian axis from Pennsylvania south to northern Alabama and Georgia. One other species, *L. intermedia*, which is found on at least one of the Appalachian Mountains in Virginia (Elliott's Knob), is not abundant on the Coastal Plain. It is the dominant species of the genus, however, in most of glaciated eastern North America. This may indicate the source of some of our eastern species which are now characteristic of glaciated areas.

[1] Rhodora, xxxiii. 25–63 (1931).

3. The presence of several species in the region of Lake Michigan and Lake Erie. *Lechea minor* and *L. racemulosa*, in addition to their disrupted occurrences on the Coastal Plain and the Appalachian Upland, exhibit still another break in range by their presence about the Great Lakes. In this region, *L. racemulosa* is found only at the southern end of Lake Michigan in Indiana, while *L. minor* is found in Indiana, Michigan, Ohio and in southwestern Ontario. Except for the occurrence in Michigan the stations are all near Lake Michigan or Lake Erie. *L. Leggettii* var. *moniliformis*, the variety of *L. Leggettii* which is found on the Coastal Plain from Delaware north to Massachusetts, is also isolated in northwestern Indiana and northern Ohio. Otherwise it is absent from the interior of the continent. *L. villosa* var. *typica*, also of the Coastal Plain, is abundant in the states bordering the southern end of Lake Michigan as well as in Ohio and southern Ontario, but in these instances it is found only near the lakes or across northern Indiana and southern Michigan and is otherwise nearly absent. A comparison between the ranges of *L. tenuifolia* and of *L. villosa* var. *typica* may be of interest. In New England their ranges are somewhat similar except that *L. villosa* var. *typica* is much more a plant of the Coastal Plain. In the southern part of its range *L. tenuifolia* pushes farther into the interior. In the Mississippi Valley and in eastern Texas the ranges nearly coincide, except that, in the region of the Ohio River and in the area of the upper Mississippi, *L. tenuifolia* has proceeded farthest. Near the Great Lakes, however, *L. tenuifolia* is entirely wanting, whereas *L. villosa* var. *typica* is very abundant. The presence of *L. tenuifolia* in southern Maine and eastern Minnesota (north of the Driftless Area) attests to its hardiness, and its presence in much of southern New England proves its capacity for migration. There is no evidence to show that *L. villosa* var. *typica* is in any way more adaptable than is *L. tenuifolia*. The chief factor in the distributions appears to be this. One species, *L. villosa* var. *typica*, is a plant mostly of the Coastal Plain; *L. tenuifolia* is not. Plants of Coastal Plain range, for some reason as yet unsatisfactorily explained, are often abundant in the area at the southern end of Lake Michigan and to a lesser extent near the shores of Lake Erie.

I shall review some of the theories treating the origin of this interesting disruption of range. Peattie,[1] discussing the inland occurrence of Coastal Plain plants, states "In the flora of the Lake Michigan

[1] Rhodora, xxiv. 59 (1922).

area, at least, there are two general types of inland extension from the Coastal plain. The first type is the very discontinuous range. . . . About one third of all the Coastal plain species of this area show a roughly similar range with, perhaps, one additional station in New York State or on one of the other Great Lakes."

Later Peattie mentions *Euphorbia polygonifolia:* "This little plant of the sea strands [rather of dune-hollows] also occurs in a general way around the Great Lakes. . . . The majority of coastal plain species show a similar range." Peattie concludes that all of the species of the Coastal Plain which are found in the Great Lakes area achieved their present limits in post-glacial time, their route of migration being along the Hudson-Mohawk Valley and the Lake Ontario Basin, thence along the margin of Lake Algonquin and through the Grand River Valley of what is now Michigan, finally to arrive at the southern end of Lake Michigan. Some lingered only in this very favorable spot. Others persisted in scattered favorable areas along the way.

It is quite possible that the species of *Lechea* migrated over such a route to arrive finally near Chicago. Their abundance on Long Island and in New Jersey shows this to have been possible. The utter lack of *L. minor*, however, along most of the postulated route of migration, and the fact that one-third of all the Coastal Plain species in northern Indiana have the extreme type of disruption revealed by *L. racemulosa*, which is absent from the entire hypothetical route, make it appear quite probable that considerable geologic change has taken place to bring about this disrupted range, more, in fact, than has occurred since the last of the several minor advances of the Wisconsin ice.

W. T. McLaughlin,[1] discussing the occurrence of Coastal Plain plants in northwestern Wisconsin and speaking of the recession of Wisconsin ice and the formation of Glacial Lake Duluth, writes, "It was, presumably, during this interval, while the ice was retreating northward and before the readvance, that the forest developed at Two Creeks, Manitowoc County." (The forest was mentioned earlier by him, l. c. p. 360.) If forests could develop "when the ice had retreated somewhat to the northward" and before a minor advance, is it not evident that the climate in the vicinity of the Driftless Area and Lake Michigan was, during much of the Wisconsin, suitable for vegetative development? McLaughlin[2] suggests that the Coastal

[1] Ecological Monog. ii. 360, 361 (1932).
[2] Ecological Monog. ii. 361 (1932).

Plain plants became established in the Chicago region during the time of this minor oscillation of ice. May it not be as accurate to say that this localized Coastal Plain flora, one-third with a broad disruption in range, is a relic-flora, the result of a pre-Wisconsin dispersal, as to attempt to account for it by a hypothetical path of migration in combination with a highly improbable late glacial or post-glacial destruction of all evidence of migration?

To explain the highly relict flora of Keweenaw County Fernald[1] states "The high bluffs of Keweenaw evidently were not denuded by Wisconsin ice and, consequently, they served as centers on which many species survived." Fassett[2] explains the existing relict flora confined to the Driftless Area as being "fairly interpreted on the basis of lack of glaciation in southwestern Wisconsin" but he considers it impossible that the Driftless Area should have housed any species of the Keweenaw Area. With the Wisconsin Glaciation becoming revealed as a series of separate phases of local origin, with distinct nunataks here and there which were never overrun, it seems to me that some part of the region at the southern end of Lake Michigan, with its highly localized flora of Coastal Plain species, may well have served as a haven throughout the Wisconsin.

I will here mention several other considerable disruptions of range. The station at Belleville near the northern shore of Lake Ontario, marks an extension of range of *Lechea stricta* from the southern end of Lake Michigan. This may mean that recent migration around the Great Lakes has been in part at least in an easterly direction, in this instance from the region in and about the Driftless Area and from the area about the southern end of Lake Michigan. It should be noted, however, that the region of Belleville has long been known for its remarkably isolated stations for western species, such, for instance, as *Myosurus Shortii* Raf., a typical prairie plant with a broad range from southwestern Indiana and western Kentucky and Tennessee to Texas and Manitoba, and *Collinsia parviflora* Lindl., with general cordilleran range but isolated eastward at remote points (Keweenaw Peninsula, Michigan, north shore of Lake Ontario, and a single mountain-slope in western Vermont). *Lechea stricta* may, consequently, prove to be a pre-Wisconsin relic at its easternmost station.

The occurrence of *Lechea Torreyi* var. *congesta* in British Honduras more than eight hundred miles from the nearest station near Miami,

[1] Rhodora, xxxvii. 216 (1935).
[2] Rhodora, xxxiii. 226–228 (1931).

Florida, is one which I will not attempt to explain nor can I account for the presence in northern Oklahoma of *L. tripetala*, which otherwise is confined to areas at high elevations in Mexico, unless it be in Oklahoma a relic from a very ancient dispersal. Its southernmost station, in Guatemala, is likewise on an ancient core, as ancient as the Ozark Upland.

Material Examined

In the course of my work on this genus I have made extensive use of borrowed material and in addition I have visited the herbarium of the Philadelphia Academy of Sciences and that of the New York Botanical Garden. I have thereby been enabled to see representative material from the entire range of the genus as well as the principal type-material in American herbaria. The institutions from which I have seen specimens are listed below.

Amherst College (Amherst)
Brooklyn Botanical Garden (Brooklyn)
Field Museum (Field)
Gray Herbarium
Missouri Botanical Garden (Mo)
New England Botanical Club
New York Botanical Garden (NY)
Philadelphia Academy of Sciences (Phila)
United States National Herbarium (US)

Following the name of each of the above institutions is appended the abbreviation which I have used in this work to indicate the location of cited material. That from the Gray Herbarium and the herbarium of the New England Botanical Club, I have not specially indicated, except in the case of types. When, as frequently happened, a collection is found in several herbaria, I have cited only the one from which the specimen was distributed, if this is known.

I wish to express my appreciation to those who very generously lent me their collections for study and I appreciate the warm hospitality extended to me at the institutions which I visited. I particularly thank Professor M. L. Fernald, who, throughout the work, has given me invaluable suggestions and guidance; Mr. C. A. Weatherby for his kind assistance in various ways; Dr. Lily M. Perry for many kindly services in putting the paper into final form; and Mr. E. C. Ogden for his aid in the preparation of the photographs. Although the maps are from a plate owned privately by Professor Fernald and intended for his own use, he has very generously permitted me the use of them in this particular study which was, of course, carried on under his supervision.

Synoptic Treatment of Genus

Lechea L.[1] Perennials, suffruticose to herbaceous, subprocumbent to erect, mostly strongly branched: leaves alternate to falsely verticillate, ovate to narrowly lanceolate, or even subulate: flowers small (2–4 mm. broad), numerous; sepals 5, in two distinct series, the 2 outer narrowly lanceolate to narrowly linear or subulate, frequently inconspicuous, the 3 inner imbricated in the bud, ovate to obovate, from shorter than to greatly exceeding the outer; petals 3, dark red, mostly shorter than the sepals, imbricated, plane in the bud, after flowering very quickly withering, marcescent; stamens 3–25 (mostly 5 or 6–15): ovary short-stipitate: style very short or lacking: stigmas 3, dark-red, fimbriate-plumose: placentae 3, broad and valve-like, each bearing (primitively) a pair of erect subsessile ovules, one on each side of the posterior face:[2] capsule narrowly ovoid or obovoid to depressed-globose, with 3 valves: embryo slender, nearly straight to considerably curved in the hard endosperm.—Sp. Pl. 90 (1753) and Gen. Pl. ed. 5, no. 102 (1754).

The sections *Lechidium* and *Eulechea* are retained in this study and are separable by the characters under the two primary headings in the key.

Sect. I. Lechidium (Spach) Torr. & Gray, Fl. N. Am. i. 154 (1838); Robinson in Gray, Syn. Fl. N. Am. i[1]. 194 (1895); Grosser in Engler, Pflanzenr. iv[193]. 139 (1903). *Lechidium* Spach in Hook. Comp. Bot. Mag. ii. 286, 287 (1837) and Hist. Nat. Veg. Phan. vi. 112 (1838).

Sect. II. Eulechea Robinson in Gray, Syn. Fl. N. Am. i[1]. 192 (1895); Grosser in Engler, Pflanzenr. iv[193]. 134 (1903).

KEY TO SPECIES

a. Placentae crustaceous, uniting with the dissepiments to form within the mature capsule, opposite the valves, 3 distinct and prominent yellow structures, each with two cavities open at the back, serving to press the two seeds against the valve of the capsule: pedicels more than 3 mm. long: calyx 2.5 mm. broad or more. Sect. Lechidium (Spach) T. & G. ..... 1. *L. san-sabeana.*

a. Placentae and dissepiments within the mature capsule disintegrating or adhering to the seed (fragile, but prominent at maturity in *L. tripetala*): pedicels less than 3 mm. long: calyx less than 2.5 mm. broad, except occasionally in *L. tripetala.* Sect. Eulechea Robinson ....*b.*

b. Exterior sepals equaling or exceeding the interior sepals ....*c.*

[1] Linnaeus in Gen. Pl. ed. 5, no. 102 (1754), attributed the authorship of the genus to Kalm and in Amoen. Acad. iii. 10 (1756) he explained that the genus was dedicated to Professor J. Leche of Abo.

[2] Spach in Hooker, Comp. Bot. Mag. ii. 288 (1837), writes of the position of the ovules in relation to the placentae, "all the other *Cistaceae* having their ovules attached on the anterior face, or on the margins of the placentas."

c. Basal leaves elliptic-ovate to broadly lanceolate: cauline leaves narrowly lanceolate to elliptic-ovate....*d.*
d. Cauline leaves broadly lanceolate to elliptic: pubescence strongly spreading: capsule not exceeding the calyx....*e.*
e. Calyx depressed-globose, broadest toward the base, except in var. *macrotheca;* interior sepals strongly keeled, deeply concave; exterior sepals about equaling the interior ones: seeds inequilateral, strongly convex dorsally, light-brown, lustrous, the embryo clearly visible: capsule about as broad as long: fruits glomerate-clustered, except in var. *macrotheca*.....2. *L. villosa.*
e. Calyx pyriform, broadest above the middle; inner sepals slightly keeled; outer sepals exceeding the inner: seeds equilateral, elliptic-oblong, dorsiventrally compressed, dark-brown, the embryo not clearly apparent: fruits loosely clustered to closely racemose.....3. *L. minor.*
d. Cauline leaves narrowly lance-oblong: calyx very short, strongly pyriform: capsule considerably exceeding the calyx.....4. *L. patula.*
c. Basal leaves, if present, narrowly linear: cauline leaves always narrowly linear: fruiting calyx broadest below the middle or toward the base....*f.*
f. Calyx more than 2 mm. broad; sepals strongly keeled: seeds 4–6.....5. *L. tripetala.*
f. Calyx 2 mm. or less broad; sepals slightly or hardly at all keeled: seeds 1–4....*g.*
g. Calyx depressed-globose; outer sepals mostly exceeding the inner: capsule depressed-globose: seeds 2–4.....6. *L. tenuifolia.*
g. Calyx ovoid, considerably longer than broad; outer sepals about equaling the inner: capsule ovoid; seed 1.....7. *L. mensalis.*
b. Exterior sepals shorter than the interior ones....*h.*
h. Capsule greatly exceeding the calyx, its valves coalesced....*i.*
i. Cauline leaves linear-oblong, abruptly acute or obtuse: calyx nearly glabrous, strongly spreading from base of capsule and not at all enclosing it: wall of capsule papery.....8. *L. Deckertii.*
i. Cauline leaves lance-elliptic, sharply acute; calyx subappressed-pilose, firmly enclosing the base of capsule: wall of capsule indurated.....9. *L. divaricata.*
h. Capsule exceeded by to but slightly exceeding the calyx....*j.*
j. Basal leaves lance-elliptic to broadly elliptic-ovate, less than 3 times as long as broad: calyces strongly pyriform: pedicels exceeding calyx: seeds 1–2....*k.*
k. Basal leaves bright-green, thin, lance-elliptic to lance-ovate, spreading-pilose beneath on midrib and margin, glabrous above: cauline leaves mostly narrowly lanceolate: seeds 1–2 (mostly 2), dorsiventrally compressed, nearly or quite equilateral: fruits scattered, racemose.....10. *L. racemulosa.*
k. Basal leaves grayish-green, thick, broadly elliptic-ovate, densely pilose to tomentose below, strongly pilose above: cauline leaves broadly lance-ellip-

tic to ovate: capsule-wall strongly indurated; valves coalesced below: seed 1, irregularly ovoid: fruits loosely clustered, the pedicels spreading to reflexed.....11. *L. cernua.*

j. Basal leaves, when present, elliptic-lanceolate to narrowly lanceolate or linear, more than 3 times as long as broad: cauline leaves narrowly lanceolate or oblanceolate to narrowly linear....*l.*

l. Basal shoots lacking or with narrowly linear leaves: cauline leaves narrowly linear....*m.*

m. Exterior sepals nearly equaling the interior ones: capsule about equaling the calyx: sepals closely pilose: plant low, less than 20 cm. high.....12. *L. cubensis.*

m. Exterior sepals much shorter than the interior ones: calyx exceeding and concealing the capsule: sepals densely somewhat spreading-pilose: plants more than 20 cm. high.....13. *L. Torreyi.*

l. Basal shoots present at maturity: basal leaves elliptic-lanceolate to narrowly lanceolate or oblanceolate....*n.*

n. Basal leaves thick, dull-green, strongly subappressed- to spreading-pilose beneath on midrib and margin and somewhat on the lower face: panicle mostly branched from well below the middle, frequently subpyramidal, the branches gradually reduced above except in var. *subcylindrica*.....14. *L. maritima.*

n. Basal leaves thin, bright-green above, subappressed- to spreading-pilose beneath on midrib and margin, elsewhere glabrous: panicle mostly branched from above the middle....*o.*

o. Seeds 2–4, dorsiventrally compressed (2-sided) or obscurely 3-sided, nearly equilateral, elliptic-oblong or enlarged at base, smooth at maturity....*p.*

p. Stems and branches strongly pilose: calyx strongly pilose with somewhat spreading hairs: plant dull-green: branches crowded, strongly ascending to suberect: seeds 3 or 4.....15. *L. stricta.*

p. Stems and branches sparingly pilose: calyx sparingly pilose with appressed to somewhat spreading hairs: plant bright green: branches ascending to broadly spreading: seeds mostly 2 or 3.....16. *L. Leggettii.*

o. Seeds 4–6 (5 or 6 in larger capsules) except in var. *depauperata*, inequilateral and prominently 3-sided, dorsally convex with 2 subequal lateral faces meeting in a straight ventral keel, at maturity with a white reticulate membranaceous covering.....17. *L. intermedia.*

1. Lechea **san-sabeana** (Buckley), comb. nov. Caudex simple and ascending to strongly branched and subprocumbent: basal shoots numerous, subappressed-pilose on the axis; leaves linear, abruptly pointed, glabrous above, subappressed-pilose beneath: fruiting stems several to many, 15–35 cm. tall, sparsely foliose from near the base,

at first densely pilose, at length becoming sparingly appressed-pilose: cauline leaves linear, 6–18 mm. long, 0.6–1.3 mm. broad, on the branches often smaller, glabrous on the upper surface, at first densely pilose, at length prominently subappressed-pilose beneath mainly on the midrib and margin: panicle loosely spreading-branched from below the middle; secondary branches racemose, 5–15 cm. long, simple or once branched, bearing buds, flowers and ripe fruit often simultaneously: petals dark-red, often exceeding the sepals: stamens 7–12 or more: fruits secund, spreading at right angles to the axes, loosely distributed to somewhat remote, particularly toward the tips of the branches: pedicels slender, 3–5 mm. long, at length sparsely subappressed-pilose: calyx in fruit depressed-triangular-ovoid, 3 mm. broad, slightly more than 2 mm. long; calyx-lobes broadly ovate, dark-red on the inner surface, hood-shaped, strongly keeled dorsally, deeply concave ventrally, at first densely spreading-pilose, later coarsely subappressed-pilose, strongly so on the keel and glabrous on the broad scarious margins: bracts narrowly linear, green, about equaling sepals: capsule depressed-globose, 1.2–2.2 mm. long, 2.2–2.4 mm. broad; valves deeply ovate, spreading slightly in maturity; dissepiments and placentae crustaceous, pale-yellow, firm, persistent, attached to the base of the capsule, dividing above into 3 separate seed-bearing portions, confronting the valves: seeds normally 6, 2 of them partially enclosed by each dissepiment, light-brown; embryo slightly visible through the endosperm, ventrally concave, occasionally somewhat inequilaterally bifacial, narrowed at base and abruptly narrowed to the acute apex, usually somewhat shriveled, 1–1.1 mm. long.—*Linum San-Sabeanum* Buckley in Proc. Acad. Nat. Sci. Phila. for 1861: 450 (1862). *Lechidium Drummondii* Spach in Hook. Comp. Bot. Mag. ii. 287 (1837) and in Hist. Nat. Veg. Phan. vi. 112 (1838). *Lechea Drummondii* (Spach) Torr. & Gray, Fl. N. Am. i. 154 (1838); Eaton & Wright, N. Am. Bot. 294 (1840); Walpers, Repert. i. 213 (1842); Gray, Gen. i. 206, t. 89 (1849); Coulter, Bot. W. Texas in Contrib. U. S. Nat. Herb. ii. 24 (1891); Britton in Bull. Torr. Bot. Cl. xxi. 252 (1894); Robinson in Gray, Syn. Fl. N. Am. i^{1}. 194 (1895); Chapman, Fl. So. U. S. ed. 3: 37 (1897); Small, Fl. 799 (1903); Grosser in Engler, Pflanzenr. iv^{193}. 139, fig. 22, N–V (1903).—Coastal Plain of Texas north to Dallas and Fort Worth and westward nearly to the Edwards Plateau. Texas: Enchanted Rock, Llano Co., June 1, 1930, *Tharp & Whitehouse*, no. 86,950a; sandy open ground near Moore, Frio Co., May 9, 1928, *E. J. Palmer*, no. 33,854; dry soil near Huntsville, June 2, 1914, *N. S. Young;* de Matamoros a Goliad, April, 1834, *Berlandier*, nos. 2458, 1028; in sylvis prope el Rio de Medina, July, 1829, *Berlandier*, no. 2041 = 631; S. Felipe de Austin, *T. Drummond*, no. 17 (Hooker misit January, 1835); dry banks, Hempstead, *E. Hall*, no. 31; sandy forests, Upper Cross Timbers, *Rererchon* (Curtiss, N. Am. Pl. no. 232); dry sterile places, Galveston, *Lindheimer*, no. 16; sands, Dallas, *Rererchon*, no. 52 (US); Sabine River, *Learn-*

worth (NY); dry open ground, Bryan, Brazos Co., *E. J. Palmer*, no. 7818 (NY); San Saba Co., *Buckley* (TYPE in Herb. Phila. Acad. Sci.); San Saba Co., 1890, *Nealley* (Field); Cuero, *Bray*, no. 133 (US); Bastrop, 1928, *H. Dural* (US); College Station, June 10, 1891, *L. H. Dewey* (US); sandy soil, 20 miles south of San Antonio, *E. D. Schulz*, no. 456 (US); in sandy open oak woods at Lake Worth, Tarrant Co., *Ruth*, no. 888 (US); in sandy pasture land, Tarrant Co., *Ruth*, no. 399 (Field); Indianola, 1869, *Ravenel*, (US); Navarro Co., *Joor*, no. 83 (US); on dry flats, near Pass Izard, 1889, *F. W. Thuran* (US); Gillespie Co., *Seguaro*, no. 620 (Mo); sandy woods, Granbury, *Reverchon*, no. 52 (Mo); Aransas Pass, San Patricio Co., *Orcutt*, no. 5964 (Mo). PLATE 488, FIGS 1, 2 and 3; MAP 1.

Spach[1] divided the genus into two genera, *Lechea* and *Lechidium*. The latter was set apart on certain structural peculiarities of the species *Lechidium Drummondii*, which was described in the same article. At the same time Spach described *Lechea Drummondii* in the other genus. In brief, the description of the latter is as follows: exterior sepals longer than the interior; the capsule slightly exceeding the calyx; leaves of radical shoots ovate or elliptic, ciliate beneath; pedicels short; seeds 3, reddish-brown, smooth and shining and pellucid enough to allow the embryo to be seen through it. These characters clearly diagnose *L. villosa* Ell. Thus the name *L. Drummondii* Spach is a later synonym of *L. villosa* Ell. and may not be used, as a specific name, again in the genus.

The diagnostic characters used by Spach for the new genus *Lechidium* concern the fruit and are virtually the same which have, since his time, been employed by monographers to set apart *Lechidium* as a subgenus or section. My feeling is that it is certainly no more than a section of *Lechea;* in all superficial respects *Lechidium Drummondii* closely simulates *L. tenuifolia* and *L. tripetala*, and even in the placentae and dissepiments there is most certainly an approach to those of the last named species. The distinctive peculiarities, the extreme length of the pedicel, the very large fruits and the definite and persistent placentae and dissepiments are definite enough to allow me to follow Gray,[2] Robinson[3] and Grosser[4] in conserving the section. A new name, therefore, is needed for the plant now passing as *L. Drummondii.* The only other name ever given to it was *Linum San-Sabeanum* Buckley. Gray had seen Buckley's collection and found it to

[1] Hook. Comp. Bot. Mag. ii. 284–289 (1837).
[2] Gen. i. 206 (1848).
[3] Syn. Fl. N. Am. i[1]. 194 (1895).
[4] Engler, Pflanzenr. iv[193]. 139 (1903).

be identical with the plant which he called *Lechea Drummondii*. I also have seen the type and agree with his identification; but, according to the present rules of Nomenclature, the name must be *Lechea san-sabeana*.

2. L. VILLOSA Ell. Caudex low, simple or slightly to strongly suberect-branched: resting basal shoots numerous or lacking, 4–10 cm. long, branching or simple; the axis densely villous: basal leaves large (0.8–1.5 cm. long), crowded, mostly whorled, bright- to dark-green, broadly elliptic-ovate, mucronate-pointed or narrower and with a less distinct mucro when mature, glabrous above, villous beneath on midrib and margin: axes of developing shoots strongly villous to subappressed- or spreading-pilose; their leaves sparsely to densely villous over the entire lower surface or at least on midrib and margin and often slightly subappressed- to spreading-pilose above, or strongly subappressed-pilose over the entire lower and upper surfaces: fruiting stems one to several, 15–90 cm. high, erect to spreading, closely subcylindric-paniculate to broadly spreading-branched; the axes sparingly to densely villous or spreading-pilose either their entire length or in the panicle; the branches short, consisting essentially of fruit-clusters, or long and leafy, suberect to spreading: cauline leaves spreading to appressed, bright- to dull-green, distinctly petiolate to sessile, oblanceolate or lance-elliptic and mucronate to lanceolate or oblanceolate and acute or pointed, sparsely but conspicuously villous on the lower surface, scatteringly spreading-pilose to glabrous on the upper surface or densely spreading-pilose on both surfaces: fruit deep purplish- to greenish-brown, strongly glomerate to diffuse-glomerate or scattered-secund: pedicels 0.8–1.5 mm. long, sparsely spreading-pilose: calyx 1.4–2 mm. long, with a short yellowish-brown obconic base, about as broad as long, broadest near the base or spreading above and slightly pyriform; inner sepals from one-half to two-thirds as broad as long, with broad scarious margins, scatteringly pilose on the conspicuous keel; outer sepals narrowly lanceolate to linear and nearly or quite equaling the inner ones or broadly lanceolate (1.9–2.2 mm. long, 0.4–0.7 mm. broad) and equaling or exceeding the inner: capsules lustrous, depressed-globose, about equaling calyx; valves ovate, obtuse, broadly keeled, when mature separating to the base: seeds with a clear (transparent) endosperm with the embryo distinctly visible, decidedly inequilateral, 2-sided or obscurely 3-sided, greatly enlarged at base, abruptly acute at apex; if 3 or 4 bright-brown to clear-yellow, mostly lustrous, strongly convex dorsally, concave ventrally or flattened, 0.9–1 mm. long, 0.5–0.6 mm. broad; if 2 light-brown to pale-yellow, lustrous to dull, convex dorsally, concave ventrally, 1–1.2 mm. long, 0.6–0.7 mm. broad.

a. Fruit small: calyx less than 2 mm. long, broadest near the base; the exterior sepals linear, slightly shorter than to equaling the inner: seeds 3–4, 1 mm. or less long.

Plant bright-green: fruiting stems few, erect, tall: basal resting shoots conspicuous: pubescence on most of plant distinctly villous: cauline leaves spreading, sparingly spreading-pilose to villous beneath, glabrous to sparingly spreading-pilose on the upper surface.....Var. *typica.*

Plant dull- or grayish-green: fruiting stems several, spreading, low: basal resting shoots lacking: cauline leaves subappressed: pubescence mostly densely spreading-pilose, equally on the upper and the lower surfaces..Var. *Schaffneri.*

a. Fruit comparatively large: calyx 2 mm. or more long, pyriform, broadest at the middle; the exterior sepals large, lanceolate, equaling to slightly exceeding the inner: seeds 2, more than 1 mm. long.....Var. *macrotheca.*

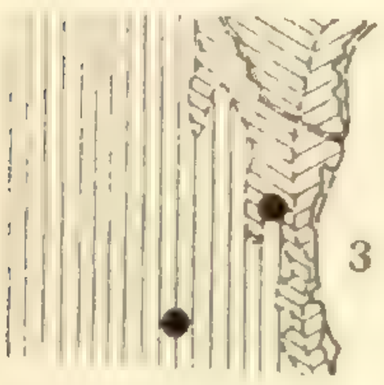
Var. **typica.** Caudex low, simple: resting basal shoots numerous, bright-green, frequently branching, large, 5–10 cm. long, developing in September except in southern United States; the axes densely villous: their leaves short-petioled, crowded, mostly in whorls, bright green, broadly elliptic-ovate, the lower ones mucronate, glabrous on the upper surface, conspicuously villous beneath on midrib and margin: fruiting stems few, erect; their axes brownish-purple, conspicuously villous: panicles closely subcylindric to broadly pyramidal; primary branches short (1–3 cm.) and consisting essentially of fruiting clusters, or up to 12 or 15 cm. long and erect or spreading and leafy: cauline leaves bright-green, spreading, 1–3 cm. long, with a distinct petiole 1–3 mm. long, oblanceolate to lance-elliptic, mucronate, conspicuously but sparsely villous on the lower surface, sparsely spreading-pilose above: fruits glomerate at ends of the primary or, in greatly branching plants, at the tips of the secondary branches: pedicels 1–1.5 mm. long, sparsely spreading-pilose; calyx depressed-globose, dark brown, broadest below the middle, meeting the pedicel in a short obconic yellowish-brown base; interior sepals broadly lance-elliptic, subacute, 1.3–1.6 mm. long, deeply concave, prominently keeled and with broad scarious margins, conspicuously pilose only on the keel; exterior sepals narrowly lanceolate to linear, nearly or quite equaling the inner: capsule depressed-globose, about equaling the calyx, 1.4–1.7 mm. long: seeds mostly 3, bright-brown to clear-yellow, lustrous, strongly convex dorsally, concave or flattened ventrally, 0.9–1 mm. long, 0.5–0.6 mm. broad.—*L. villosa* Ell. Sk. Bot. S. Car. & Ga. i. 184 (1816): Dunal in DC. Prod. i. 285 (1824); Beck, Bot. N. & Mid. St. i. 36 (1833); Darlington, Fl. Cestrica, 96 (1837); Dietr. Syn. Pl. i. 415 (1839); Britton in Bull. Torr. Bot. Cl. xxi. 248 (1894); Britton in Britton & Brown, Ill. Fl. ed. 1, ii. 442, fig. 2477 (1897); Britton, Man. 632 (1901); Small, Fl. 798 (1903); Robinson & Fernald in Gray's Man. ed. 7: 578 (1908); Stone, Pl. So. N. J. 563, pl. 83, fig. 1 (1911); N. Taylor, Fl. Vic. N. Y. 448 (1915); Small, Man. 882 (1933). *L. major* sensu Michx. Fl. Bor.-Am. i. 76 (1803); sensu Ait. f. Hort. Kew. ii[1]. 185 (1810); sensu Bigelow, Fl. Bost. 28 (1814); sensu Pursh, Fl. Am. Sept. i. 90 (1814); sensu Eaton, Man. ed. 2: 296 (1818); sensu Barton, Fl. Phil. 75 (1818); sensu Torrey, Fl. i. 60 (1824); sensu Eaton &

Wright, N. Am. Bot. 294 (1830); sensu Torrey & Gray, Fl. N. Am. i. 153 (1838); sensu Darby, Man. Bot. So. St. ii. 33 (1841); sensu Torrey, Fl. N. Y. 78 (1843); sensu Gray, Man. 49 (1848); sensu Chapman, Fl. So. U. S. 36 (1860) and subsequent editions including ed. 3; sensu Leggett in Bull. Torr. Bot. Cl. vi. 251 (1878); sensu Robinson in Gray, Syn. Fl. N. Am. i^{1}. 192 (1895); not L. *L. minor* sensu Smith in Rees's Cycl. 20 (1819). *L. Drummondii* Spach in Hook. Comp. Bot. Mag. ii. 284 (1837) and in Hist. Nat. Veg. Phan. vi. 110 (1838), including in greater part the *L. major* var. *villosa* Grosser in Engler, Pflanzenr. iv^{193}. 136 (1903). *L. mucronata* Raf. New Fl. N. Am. i. 193 (1836); sensu House, Annot. List Ferns & Fl. Pl. N. Y. 497 (1924); not *L. mucronata* of Raf. Précis des Découvertes, 37 (1814); *L. major* var. α. *villosa* Grosser in Engler, Pflanzenr. iv^{193}. 136 (1903).—Generally abundant in sandy or gravelly soils in fields and open woods or on open slopes, southern New Hampshire to Florida, west to Michigan, Oklahoma and eastern Texas; absent from the Appalachian Mountains. Var. *typica* is so definite a plant that it is unnecessary to cite the numerous specimens examined. Plate 488, figs. 4, 5, and 6; map 2.

Var. **Schaffneri**, var. nov. Caudex multiceps ramosus ramis gracilibus sine ramis basilaribus; caules fructiferi plures suberecti 15–40 cm. alti dense patuleque pilosi vel villosi; folia subadpressa lanceolata vel oblanceolata anguste acuta vel acuminata opaca viridia supra et subtus dense patuleque pilosa 8–15 mm. longa 2.5–5 mm. lata; panicula anguste subpyramidata, rami breves valde ascendentes; flores in glomerulos laxos vel racemos densos dispositis.—Mountains of central Mexico. I have seen the following specimens. Tamaulipas: La Vegonia, vicinity of San Jose, alt. 3000 ft., *H. H. Bartlett*, no. 10,020 (US). San Luis Potosi: in montibus San Rafael, 1876, *Schaffner*, no. 602 (type in Gray Herb.), 1879, *Schaffner*, no. 471 (US). Map 3.

Var. **macrotheca**, var. nov. Caudex plerumque multiceps ramis brevibus; rami basilares 1.5–3 cm. longi eorum folia late lanceolata patule pilosa vel villosa; folia caulina lanceolata vel oblanceolata acuta 1–3 cm. longa 2–7 mm. lata supra et subtus pilosa pilis patulis vel subadpressis; flores laxe glomerati vel dense secundo-racemosi; pedicelli 1 mm. aut minus longi; calyx late pyriformis pallide brunneus supra basin valde dilatatus 1.9–2.1 mm. longus 1.9–2 mm. latus; sepala interiora lanceolato-elliptica acuta 2-plo longiora quam lata; sepala exteriora lanceolata 1.9–2.2 mm. longa 0.4–0.7 mm. lata interiora aequantia vel paullo superantia saepe lucida 1–1.2 mm. longa 0.5–0.7 mm. lata inaequilateralia latere dorsali convexa ventrali concava vel rarius convexa et subangulata.—Sand-hills, prairies and sandy woods, west-central Nebraska to southern Texas. The following specimens have been seen. Nebraska: sand-hills, Loup Fork, August 26, 1853–1854, *F. V. Hayden* (Mo); prairies and sand-hills of Kearney Co., *Rydberg*, no. 6632 (NY); Minden, July, 1892, *Hapeman* (NY); Minden, August, 1893, *Hapeman* (US). Oklahoma: in open

1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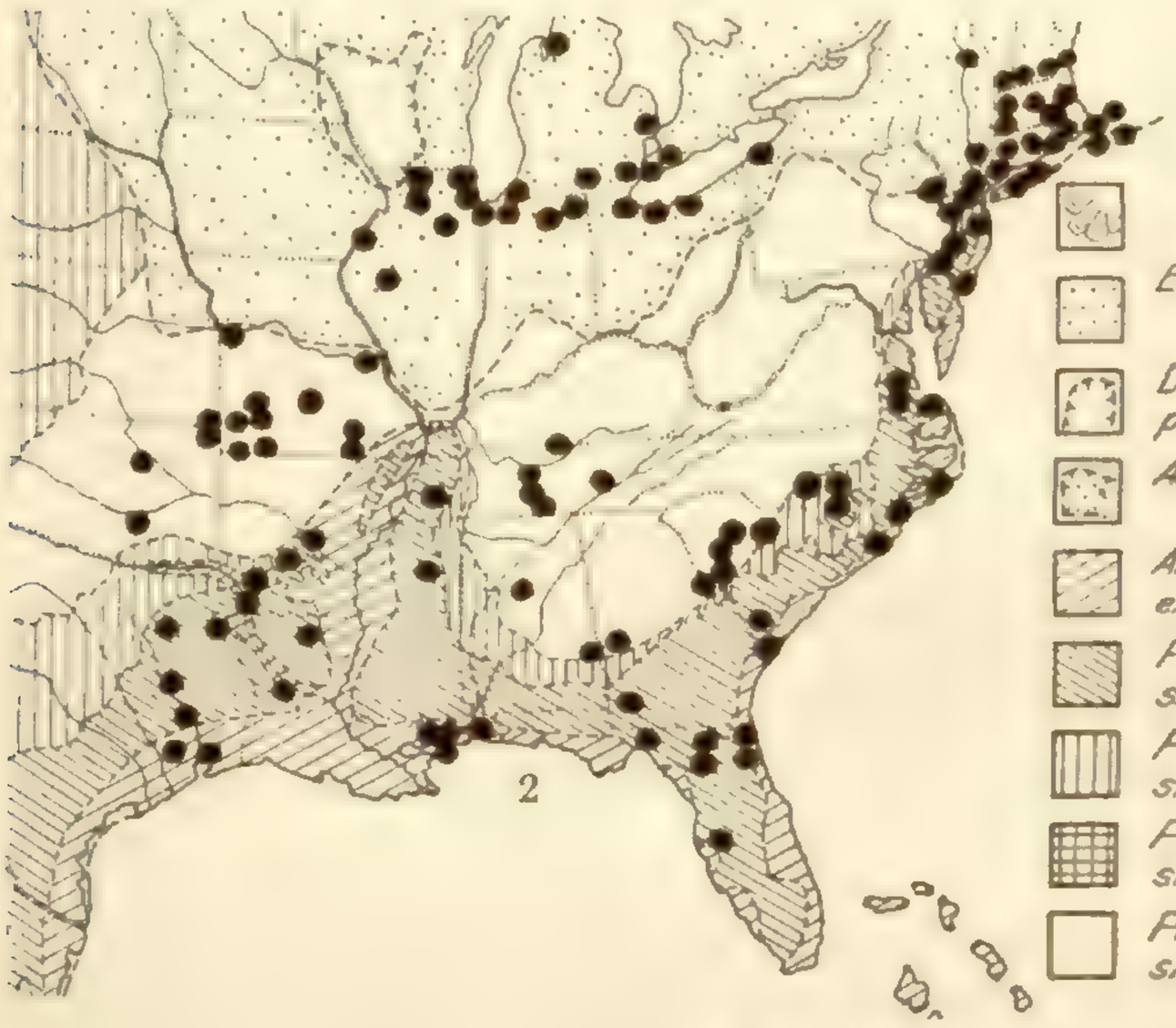

2

EXPLANATION

Existing glacial fields.

Exposed after disappearance of PLEISTOCENE ice.
?-Insufficient data.

Driftless & nunatak areas wholly or partly exposed during PLEISTOCENE.

Areas of mountain & valley glaciation during the PLEISTOCENE.

Atlantic coastal plain & Pacific areas exposed during the QUATERNARY.

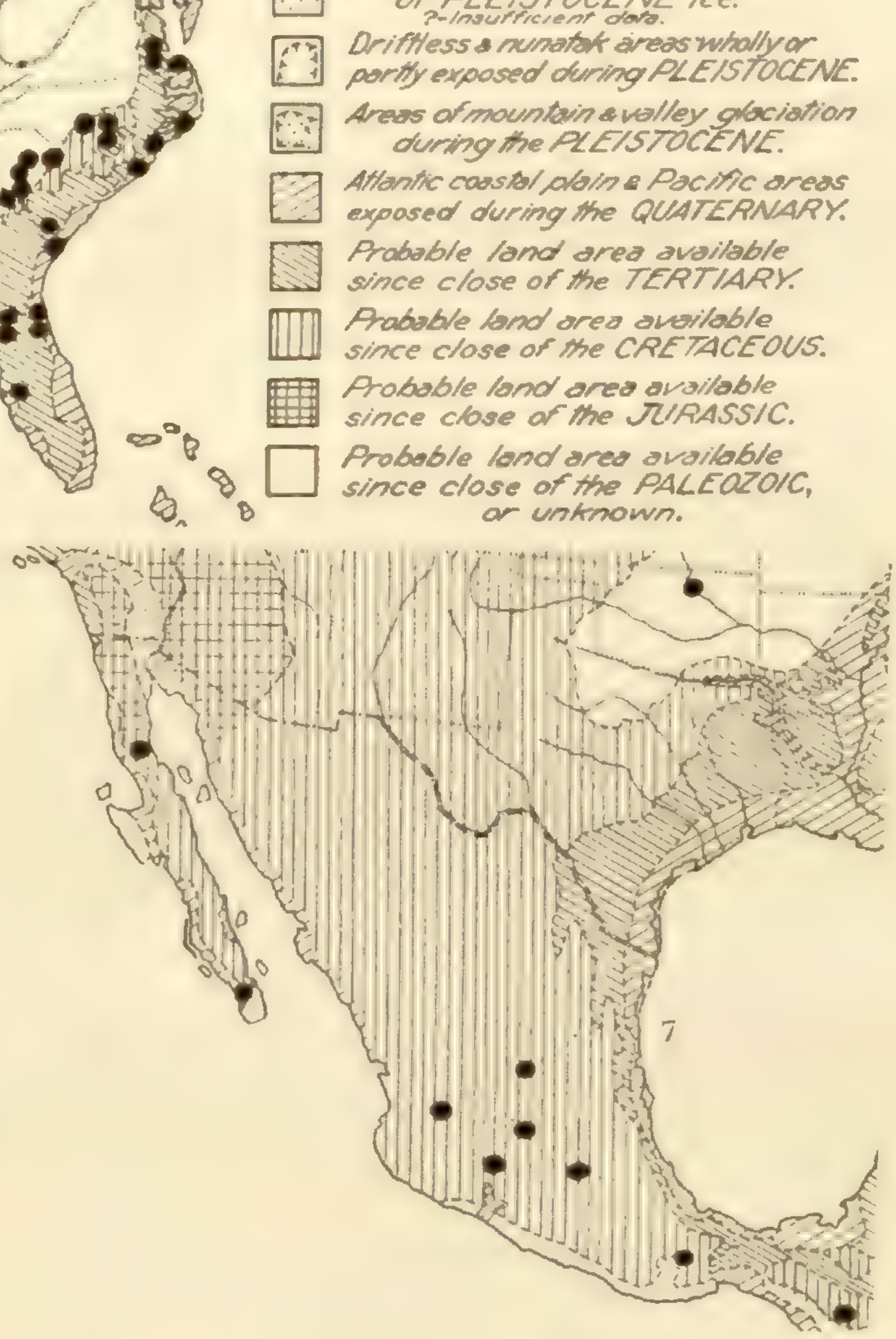
Probable land area available since close of the TERTIARY.

Probable land area available since close of the CRETACEOUS.

Probable land area available since close of the JURASSIC.

Probable land area available since close of the PALEOZOIC, or unknown.

6


7

MAP 1, range of LECHEA SAN-SABEANA; 2, of L. VILLOSA, var. TYPICA; 3, of L. VILLOSA, var. SCHAFFNERI; 4, of L. VILLOSA, var. MACROTHECA; 5, of L. MINOR; 6, of L. PATULA; 7, of L. TRIPETALA.

sandy woods, near Cleo, Major Co., *G. W. Stevens*, no. 1728 (TYPE in Gray Herb.); Woodward Co., July 14, 1900, *Paul J. White* (Mo). TEXAS: sandy open ground, Fort Chadburn, Coke Co., *E. J. Palmer*, no. 12,453. PLATE 488, FIGS. 7 and 8; MAP 4.

H. D. House[1] has taken up the name *Lechea mucronata* of Rafinesque for our *L. villosa*. The former name antedates by two years the latter which, according to Barnhart,[2] was published in 1816. Grosser[3] in his monographic treatment cited *L. mucronata* as a synonym of *L. major*, our *L. villosa*. The only possible diagnostic features of Rafinesque's description are embodied in the following[4]: "feuilles oblongues-cuneiformes mucronées, fleurs en grappe composée." So many species have the "fleurs en grappe composée" that this portion of Rafinesque's diagnosis might apply to most members of the genus. The other phrase "feuilles oblongues-cuneiformes mucronées," applies equally well to *L. minor* and to *L. villosa* as do the brief diagnostic phrases for some others of Rafinesque's proposed species. Without type-material to show exactly what the author had, it is futile to guess; and only confusion can result by overthrowing a well characterized and clearly typified name, such as *L. villosa*, by taking up for it a vague name which must always be open to doubt. Elliott[5] indicated definitely what he had. Following a brief Latin description is a discussion, part of which I quote, "the radical and young stem branches covered with white hairs . . . branches 2–4 ins. long that trail on the ground . . . seed 1 in each cell, oblong, angled at one side, acute at each end. . . This plant if kept from running to seed would probably form a very neat edging for the beds of a flower garden." Dr. Svenson of the Brooklyn Botanic Garden told me in 1933 that there was an occasional demand there for seed of *L. villosa* for horticultural purposes. Horticulturally, any other species would, I believe, receive no more than passing attention and that only by seekers of the curious. Elliott's *L. villosa* is supported further by a type specimen, which Britton,[6] p. 248, states is in the Elliott Herbarium. In 1836 Rafinesque again used the name *L. mucronata*, accompanying it this time with a more complete but weak description and with a statement that it was the same as Elliott's *L. villosa*. It is

[1] Annot. List Ferns & Fl. Pl. N. Y. 497 (1924).
[2] Bull. Torr. Bot. Cl. xxviii. 680–688 (1901).
[3] Engler, Pflanzenr. iv[193]. 136 (1903).
[4] Précis des Découvertes et Trav. 37 (1814).
[5] Sk. Bot. S. Car. & Ga. i. 184 (1816).
[6] Bull. Torr. Bot. Cl. xxi. 247, 248 (1894).

enough to say that there will always be confusion in our minds regarding Rafinesque's Lecheas. The name *L. major* has been used until recently for our *L. villosa*, despite the fact that Elliott, l. c., accurately states in the synonymy of *L. villosa* "*L. major* not of Linn. which was an *Helianthemum*." Smith[1] also realized this important fact but, from the mixture of species which Linnaeus had in his herbarium representing *L. minor*, Smith chose a specimen of *L. villosa* as typical. That he doubted the advisability of the choice is manifest by the following quotation, "Amid all this uncertainty we would rather strike out *L. major* and give a new name perhaps heterophylla to our *minor*." Britton[2] has given the currently accepted interpretation of the Linnean type of *Lechea*. The specimens of *L. villosa* which are represented in the Linnean Herbarium are not referable in any way to the description in the *Species Plantarum*. The specimen which is directly referable to the description is the very distinct species which we now call *L. minor* (see discussion of that species).

Much of the southern material, including the Virginia and Florida specimens, differs in habit from most of the northern plants. Close checking revealed no fundamental differences. Seeds, capsules and calyces, as well as leaves, were alike in both. The northern plant, limited by the growing season, produces fruit in dense clusters on short branches, which are borne in a compact spire-like inflorescence. Along the coast from Virginia to Florida and Texas the vegetative development is frequently more extensive. In Florida the fruiting stems may become perennial near their bases, sending out lateral branches at intervals along the axis, resulting, after a time, in a broadly branched plant. The usual effect of the longer growing season on *L. villosa*, as on other species, is to increase the vegetative growth, which may serve to initiate structural differentiation in some members of the genus. The increased growing season has not, however, brought about any differences in *L. villosa* greater than those earlier described. I do not consider that these differences deserve formal rank, because of the great variation in habit of the species throughout its range. They seem, however, to permit of an explanation and only for that reason do I mention them here.

Lechea villosa var. *Schaffneri* differs somewhat strikingly from var. *typica* by its shrubby base, lack of basal shoots, mostly low tufted

[1] Rees's Cycl. 20 (1819).
[2] Bull. Torr. Bot. Cl. xxi. 247, 248 (1894).

habit and dull-green color, which may be accounted for, probably, by the very strong development of pubescence on the upper surfaces of the lanceolate leaves. These are considerably narrower than those of var. *typica*. As in several other tropical and subtropical species of the genus, basal resting shoots are lacking. The new shoots develop immediately from the caudex, near the base, or above from persisting stems, and at first have slightly broader leaves than in the mature condition. In such capsules as were mature enough for study there were mostly four seeds. Plants of *L. villosa* var. *typica* in a similar stage of development have mostly three seeds in each capsule. Not enough specimens, however, of the Mexican variety have been seen to make a safe generalization. The fruits in other respects closely resemble those of typical *L. villosa*, except that they are produced in fewer clusters of less densely aggregated individuals.

It is difficult to say whether there were two distinct collections of this plant by Schaffner. In the Gray Herbarium is a sheet labelled "in montibus San Rafael, 1876, no. 602" and in the United States National Herbarium is another labelled "San Luis Potosi: 1879, Dr. J. G. Schaffner, no. 471." The single sheet of Schaffner's collection in the New York Botanical Garden is given both of these numbers. Grosser[1] cites the Schaffner material as two separate numbers. In a discussion of Schaffner's work, Hemsley[2] says, "From time to time further contributions were received from him, the last in 1881, through Dr. Asa Gray, from the neighborhood of San Luis Potosi where he resided some time before his death . . . unfortunately each collection was separately numbered." It is difficult then to say whether we have one or more than one collection of *L. villosa* var. *Schaffneri* by Schaffner, especially since the specimens are of a similar age and appearance.

Lechea villosa var. *macrotheca* differs from the wide-ranging var. *typica* and from var. *Schaffneri* in its short basal shoots which bear lanceolate leaves, its less striking villosity throughout, the paler-brown, much larger and more scattered fruit, the narrower lanceolate leaves which are usually strikingly pilose above, the two large seeds contrasted with the 3 (4) of var. *typica* and, perhaps most striking of all, in the extremely large exterior sepals (the largest in the genus).

3. L. MINOR L. Caudex simple or with a few short ascending branches: basal shoots in September and October slender, mostly not

[1] Engler, Pflanzenr. iv[193]. 136 (1903).
[2] Biol. Centr. Am. iv. 134, 135 (1886–1888).

exceeding 5 cm. in length, subappressed-pilose; their leaves mostly verticillate, frequently in whorls of 3, ovate to elliptic-ovate, mucronate, 4–7 mm. long, about half as broad, spreading-pilose to subvillous beneath on midrib and margin, frequently sparingly scattered-pilose above: fruiting stems 1 to several, slender, leafy, 20–50 cm. high, with numerous short ascending to appressed primary branches or with long ascending primary branches and short ascending secondary ones: panicle compact, leafy, mostly narrowly subcylindric (occasionally much broader, to subglobose); the axis with fine subappressed to spreading incurved hairs: cauline leaves bright-green, short-petioled; those below the panicle frequently in whorls of 3 or 4, elliptic-ovate to lanceolate, mucronate, finely, often inconspicuously, spreading-pilose over the entire surface above and beneath; those in the panicle mostly scattered, lance-oblong to narrowly lanceolate or oblanceolate, slightly or not at all mucronate, inconspicuously pilose beneath, mostly glabrous above; rameal leaves similar to the upper cauline, often very small: fruits mostly clustered, at times scattered or even secund: pedicels 1–2 mm. long, sparsely subappressed-pilose: calyx pyriform, with a short, pale nearly glabrous obconic base, 1.6–2 mm. long, 1.2–1.5 mm. broad; inner sepals brownish-green, subappressed-pilose, distinctly keeled, narrowly elliptic-ovate, obtuse, abruptly narrowed near base; outer sepals bright-green, narrowly lanceolate to linear, equaling to considerably exceeding the inner ones: capsule about equaling the calyx, lustrous, ellipsoid-ovoid to elongate-ellipsoid, often appearing slightly inequilateral; the valves slightly unequal in length or breadth or both: seeds 2–3, light- to dark-brown, dull, 0.9–1.1 mm. long, narrowly elliptic-ovate to lanceolate, subacute, nearly equilateral, dorsi-ventrally compressed, but slightly convex dorsally and flattened beneath or obscurely 3-sided and conspicuously angled ventrally.—Sp. Pl. 90 (1753); Britton in Bull. Torr. Bot. Cl. xxi. 247 (1894); Britton in Britton & Brown, Ill. Fl. ii. 442, fig. 2475 (1897); Britton, Man. 632 (1901); Grosser in Engler, Pflanzenr. iv[193]. 135 (1903); Small, Fl. 798 (1903); Robinson & Fernald in Gray's Man. ed. 7: 578 (1908); Stone, Pl. So. N. J. ii. 562, pl. 83, fig. 3 (1911); Small, Man. 882 (1933). *L. thymifolia* Michx. Fl. Bor.-Am. i. 77 (1803); Elliott, Sk. Bot. S. Car. & Ga. i. 185 (1816); Smith in Rees's Cycl. xx. (1819); Leggett in Bull. Torr. Bot. Cl. vi. 251 (1878); Chapman, Fl. So. U. S. ed. 2, Suppl. 678 (1892) and ed. 3: 37 (1897); not Pursh. *L. Novae-Caesareae* Austin in Gray, Man. ed. 5: 81 (1867); Wood, Am. Bot. & Florist, 47 (1870).—The Coastal Plain and inland in river-valleys, Massachusetts to Louisiana, in the mountain regions of North Carolina, Kentucky, Tennessee and Alabama, and in the region of the lower Great Lakes. I shall omit citing specimens of this clearly defined and unusually constant species. Map 5.

In 1894, Britton[1] discussed the typification of the quite inadequately diagnosed Linnean *Lechea minor*. There are, according to Britton,

[1] Bull. Torr. Bot. Cl. xxi. 247 (1894).

several species represented in the Linnean Herbarium. The only specimen, however, which is directly referable to the description is the one marked, "Capraria fol. integerrimis, fl. virg.," this phrase also being cited after Linnaeus' very brief description of *L. minor*.[1] Britton chose this specimen for the TYPE of *L. minor*. It is the plant with which we are here concerned.

Until Britton cleared up the situation the name *Lechea minor* was regularly applied to at least two others of our northeastern species, *L. Leggettii* and *L. intermedia*, and, at times, to *L. tenuifolia*, *L. maritima* and *L. racemulosa*. Under the separate treatment of these will be found further discussions of their identification with *L. minor*.

Lechea thymifolia of Michaux is difficult to place by its very brief description, but Leggett,[2] under his discussion of this species, remarks, "distinguished by its long outer sepals, and leafy panicle. I have received a fragment of Michaux's specimen by the kindness of Prof. Decaisne". On the basis of Leggett's statement I admit this name in the synonymy of *L. minor* L. The greater number of American authors since Michaux and to the time of Britton, excepting Pursh, followed Michaux in using the name *L. thymifolia* for the species here treated as *L. minor*.

Lechea novae-caesareae Austin is, as shown by the type material, referable to our *L. minor*.

Grosser[3] cites as synonyms of *Lechea minor* L. Rafinesque's *L. secundiflora*, *L. pauciflora*, *L. brevifolia* and *L. uniflora*. Recourse to their original descriptions[4] shows that not one would apply to the plant we know as *L. minor* L. and which Grosser clearly described in the monograph, l. c. *L. secundiflora* has, "leaves scattered, lax, narrow, linear . . . flowers remote secund," characters which delineate *L. tenuifolia*, inasmuch as the remainder of the description clearly applies to it. *L. pauciflora* with "leaves scattered, slender, linear cuneate . . . small plant only 3 inches high" is apparently an ecological variant of some other species which, in the complete absence of other pertinent data, is unrecognizable. *L. brevifolia* is closer to *L. minor* L. Portions of the description, "leaves scattered petiolate short lanceolate or oblong ciliolate mucronate," apply to our species but by the phrase "flowers secund, pedicels equal" Rafinesque again

[1] Sp. Pl. i. 90 (1753).
[2] Bull. Torr. Bot. Cl. vi. 251 (1878).
[3] Engler, Pflanzenr. iv[133]. 135 (1903).
[4] New Fl. N. Am. i. 95, 96 (1836).

shows that he probably had a confused notion of the plant he described. *L. uniflora* is an extraordinary form which Rafinesque saw in his travels, "Summits of the Alleghany Mts. of Maryland disc. 1825, only 3 or 4 ins. high, only 5 or 6 leaves and one or 2 flowers, capsule commonly with 6 oval seeds." It is hopeless to try to identify this particular one of Rafinesque's Lecheas.

One species, *Lechea stellata*, cited under *L. minor* L. by Grosser, may be taken to fit our conception of *L. minor* L. Rafinesque's description, in part, "leaves 3–4 nate petiolate, elliptic mucronate, upper leaves alternate lanceolate . . . pedicels shorter . . . external sepals very long," applies to *L. minor* L. and no other. The "pedicels shorter" is in relation to the length of the flower. Leggett, discussing Rafinesque's treatment, states of *L. stellata*, "this is undoubtedly the *L. thymifolia* of Michaux, Pursh, Smith, etc., the *Nova-Caesarea* Austin."

Lechea minor, like *L. racemulosa*, though a Coastal Plain species, is found also on some of the Appalachian summits and near Lakes Erie and Michigan. Unlike *L. racemulosa*, however, it has succeeded either in establishing itself in New England since the Wisconsin or in maintaining itself there in more favored localities during that phase of glaciation. Its localization in New England and the fact that on Cape Cod it is growing, most frequently, in company with ancient genera of the Coastal Plain (*Aletris*, *Lachnanthes*, *Drosera*, sect. *Indicae*, etc.) indicate that it probably has not migrated northward from the southern limits of the latest Wisconsin advances of ice. Furthermore, *L. minor* varies very little, having produced no geographical varieties in recent time, despite its occurrence in such widely separated and dissimilar localities. It is in no sense a weedy species. The specimens which I have seen on Cape Cod are mostly restricted to narrow borders on the upper shores of the ponds so numerous in that region. They are in no sense adaptable or aggressive as are *L. villosa*, *L. intermedia* and *L. maritima*.

4. L. PATULA Legg. Plant dull-green, subherbaceous, with a simple to slightly branching caudex, or suffruticose and with annual upper branches: basal shoots of the subherbaceous plants and new branches of the suffruticose plants appearing in winter; leaves of the early or resting shoots narrowly elliptic to narrowly oblong, acute, 3–5 mm. long, 0.7– slightly more than 1 mm. wide, prominently and finely pilose beneath with mostly spreading short hairs on midrib and margin, frequently sparingly so elsewhere, glabrous on the upper surface:

leaves of the developing shoots large, frequently 1–1.5 cm. long, spatulate-oblong to lance-elliptic, slightly pilose above: fruiting plants 15–70 cm. high, the short plants densely and closely branched, the tall ones openly spreading-branched: flowers scattered-racemose on the straight and mostly spreading secondary and tertiary branches or crowded toward their tips: stamens few, variable in number (often 6): flowering period often of considerable duration, both mature fruit and flowers occurring simultaneously on old woody plants: fruits scattered-racemose to crowded: pedicels less than 2 mm. long (often about 1.5 mm.), sparsely subappressed- to spreading-pilose: calyx sparsely pilose to nearly glabrous, distinctly pyriform, somewhat spreading, not clasping the capsule; inner sepals slightly concave, lance- to narrowly oblong-elliptic, obtuse; exterior sepals linear, equalling to exceeding the inner: capsule with a broad blunt apex, elongate-ellipsoid to -obovoid, 1.6–1.9 mm. long, 0.9–1.1 mm. broad, considerably exceeding the calyx; the valves in maturity splitting apart only toward the apex: seeds 1 (2), dark-brown, with embryo not visible, subequilateral, slenderly ovoid or somewhat compressed dorsiventrally, 1–1.2 mm. long, about half as broad.—Bull. Torr. Bot. Cl. vi. 251 (1878); Britton in Bull. Torr. Bot. Cl. xxi. 250 (1894); Robinson in Gray, Syn. Fl. N. Am. i[1]. 194 (1895); Chapman, Fl. So. U. S. 37 (1897); Grosser in Engler, Pflanzenr. iv[193]. 138 (1903); Small, Fl. 799 (1903) and Man. 882 (1933), including *L. exserta* Small, Man. 882 (1933) and *L. prismatica* Small, Man. 882 (1933).—Sandy soil, often in pine forests, South Carolina to Florida and Mississippi, frequently inland. The following are characteristic. SOUTH CAROLINA: Camden, Kershaw Co., *H. D. House*, no. 2641 (US); Aiken, August 1, 1873, *Ravenel*. GEORGIA: sand flats between Savannah and Bonaventure, August 31, 1913, *B. M. Duggar* (Mo); dry pine-barrens, Leslie, *Harper*, no. 485; dry pine-barrens along Spring Creek, near Brinson, Decatur Co., *Harper*, no. 1927; dry sand near open pond, Decatur Co., *Harper*, no. 1206. FLORIDA: Jacksonville, 1873, *H. D. Keeler;* dry sandy pine-barrens, *Chapman*, no. 4134; dry pine-barrens, Duval Co., *Curtiss*, no. 232** (TYPE, Herb. N. Y. Bot. Gard.); Lake City, Columbia Co., *Nash*, no. 2490; St. Augustine, January, 1873, *M. C. Reynolds* (NY); Huckleberry Creek, Apalachicola, October 26, 1893, *Chapman* (Mo); sand-dunes, Daytona to Mosquito Inlet, Volusia Co., *Small & DeWinkeler*, no. 9710 (NY); dry pine-barrens, Eau Gallie, *Curtiss*, no. 5833; Cape Canaveral, East Coast, *A. B. Burgess*, no. 614 (Field); New River, December 26, 1895–January 11, 1896, *A. S. Hitchcock* (Field); dry sandy soil, Sanford, June 28, 1920, *S. Rapp* (NY); vicinity of Eustis, Lake Co., *Nash*, no. 1599; high pineland, Jessamine, Pasco Co., *Barnhart*, no. 2626 (Field); coastal dunes opposite Melbourne, *Small, Small & DeWinkeler*, no. 10,339 (NY); pine-lands 10 miles west of Vero, St. Lucie Co., *Small, Small & Mosier*, no. 11,098 (NY); pine-lands west of Halendale, Broward Co., *Small, DeWinkeler & Mosier*, no. 11,089 (NY), the type of *L. exserta* Small;

scrub, east of Sebring, De Soto Co., *Small & DeWinkeler*, no. 9787 (NY), the type of *L. prismatica* Small; scrub, ancient sand-dunes between Avon Park and Sebring, *Small, Small & DeWinkeler*, no. 10,753 (NY); pine-lands between Miami and Cocoanut Grove, *Small*, no. 4094 (NY); hammocks, west of Cocoanut Grove, Dade Co., *Small*, no. 7964 (NY); Miami, *Small & Nash*, no. 53 (NY). ALABAMA: sandy pine-ridges, Springhill, October 4, 1894, *Mohr*, no. 11 (NY); common in woods, Spring Hill, *Bush*, no. 162 (US). MISSISSIPPI: Pass Christian, July, 1881, *Langlois* (Field); Horn Island, July 25, 1897, *C. F. Baker*, no. 688 (NY); Horn Island, Biloxi, July 16, 1894, *Tracy* (NY); very dry open soil in pine woods, Biloxi, October 7, 1896, *Kearney* (US). MAP 6.

Leggett's discussion of *Lechea patula*[1] is clear and complete enough to diagnose that species. No types were indicated. Leggett stated, however, that the name *patula* referred "to the broadly spreading branches and branchlets in specimens from S. Carolina." I have seen none of Rugel's specimens, which are mentioned by Britton[2] and by Grosser.[3] Britton states that the TYPE is in the Columbia College Herbarium but cites no specimens. None of the specimens in the herbarium of the New York Botanical Garden are marked "nov. spec." but several in the Gray Herbarium are so marked. Of the specimens cited by monographers of the genus *Lechea* since 1878 that of *Curtiss*, "Duval Co., Florida, N. Am. Pl. no. 232**", is an excellent example. Because of this and the fact that it is in the most important herbaria, I have selected it as the TYPE.

Grosser,[4] following the Index Kewensis, lists *Lechea sessilifolia* Raf. as a synonym of *L. patula*. Rafinesque[5] described *L. sessilifolia* as having "sessile flowers." It is placed in his subgenus *Eudiexa*, having, among other characteristics, "3–9 seeds." Quite obviously this is not *L. patula*, which usually has 1, but occasionally 2 seeds in a single capsule, never more, to my knowledge.

Lechea patula, like the other partly shrubby Lecheas of the southeastern United States, is astonishingly variable in the size and shape of the leaves produced at different stages of growth. The rather striking and sharp contrast in basal and cauline leaves met with in more northern species is quite lacking in this species, in which growth may and does occur throughout the year. By slow and constant

[1] Bull. Torr. Bot. Cl. vi. 251 (1878).
[2] Bull. Torr. Bot. Cl. xxi. 250 (1894).
[3] Engler, Pflanzenr. iv[193]. 138 (1903).
[4] Engler, Pflanzenr. iv[193]. 138 (1903).
[5] New Fl. N Am. 97 (1836).

differentiation, the shoots often develop with hardly any rest-period. They may arise either from the base of the plant or from higher on the stem or branches. Two genetically similar plants would be quite dissimilar in leaf-size and -shape at different seasons of the year. It is not surprising, then, that Small[1] has described two species which, after an extended comparative study, I find are but growth-phases of *L. patula*. Both are from southern Florida, in a winterless climate which obviously causes a greater and more extended vegetative (woody) growth to take place than is possible, for example, in South Carolina. Both are striking enough as individuals to warrant attention.

In the description of *Lechea prismatica*, Small mentions ". . . . basal shoots with narrowly linear-elliptic to linear-spatulate leaf-blades." On the type-specimen (scrub, east of Sebring, De Soto Co., *Small & DeWinkeler*, no. 9787), there are no basal shoots, so-called, but the other collection representing the species (scrub, ancient sand-dunes between Avon Park and Sebring, *Small, Small & DeWinkeler*, no. 10,753) consists of a specimen with well developed (very advanced) young shoots which are producing the nearly mature foliage described by Small in the above passage. A few lingering lance-elliptic leaves indicate that the development of the shoot is that typical of *L. patula*.

Except in the greater limits of size attributed to *Lechea prismatica* by Small his descriptions of this species and of *L. patula* are very similar. The only distinguishing features mentioned are (1) "the ellipsoid-prismatic capsule" of *L. prismatica*, contrasted with the "oval often broadly so" capsule of *L. patula* (hardly a significant difference to one who is acquainted with the variation within certain limits of a single structure in this or any other species of *Lechea*) and (2) the "very long outer sepals" of the former, contrasted with the "shorter ones" of *L. patula* (here again not an important feature, except as we can compare the length of sepals with some other part of the same plant). It may be that Small has something here worthy of varietal or specific rank. Until more material has been collected and the vegetative development shown to produce plants which differ essentially from *L. patula*, in comparative stages of growth, I must consider the plant to belong to *L. patula*. Small himself collected a specimen (coastal-dunes opposite Melbourne, no. 10,339) which he did not name but which closely resembles the specimens he labeled *L. prismatica*.

[1] Man. 882 (1933).

Lechea exserta Small, l. c., is represented by one sheet (pine-lands west of Halendale, Broward Co., *Small, DeWinkeler & Mosier,* no. 11,089). The specimen lacks developing shoots and appears definitely to be *L. patula* in a robust and highly fertile form. On this specimen the exterior sepals reach the lower limit of size for the species. Without more material of a similar character I hesitate to call this anything but *L. patula.*

Nearly all of the South Carolina, Mississippi and Alabama specimens which, at first glance, appear to be distinct from those of Small's collecting were collected during the summer or early fall. Small's plants were invariably of late fall or winter. The difference would be conspicuous inasmuch as *L. patula* matures its fruit over a considerable period of time and undergoes progressive transformations (above described) in the size and shape of its leaves.

When all of these facts are taken into consideration we must bring together under one species (*Lechea patula*) the material described by Small as *L. prismatica* and *L. exserta,* as well as the somewhat diversified group of plants having the pronounced characteristics of the type.

5. L. TRIPETALA (Moç. & Sess.) Britton. Caudex woody, extensive, usually multicipital, mostly decumbent, its branches generally devoid of leaves but in the spring sending forth densely pilose shoots bearing leaves essentially similar to but smaller than the adult foliage; these shoots developing immediately (without a rest-period) into the erect to semi-prostrate annual or perennial flowering stems: flowering stems numerous, bearing fine wiry branches from below the middle, densely leafy, sparsely pilose with mostly fine spreading hairs below and with more appressed hairs above and on the branches: panicles with spreading branches interlaced to form a broad depressed-globular crown, 15–20 cm. tall, frequently of greater breadth; lower branches with secondary branches, the uppermost simple: cauline and rameal leaves linear, abruptly subacute at both apex and base, 6–12 mm. long, 0.7–1.3 mm. broad, pilose with somewhat spreading hairs on the lower surface, most abundantly so on the midrib, slightly pilose to glabrous above: fruits mostly secund, particularly on the upper simple branches, on occasional plants mainly clustered: pedicels 2–3 mm. long, slender, suberect to spreading, pilose with mostly appressed hairs; calyx somewhat deltoid and depressed-globose, broadest near the base, 2.3–2.6 mm. broad, 2–2.2 mm. long, evenly subappressed-pilose; interior sepals ovate, about as broad as long, strongly keeled; exterior sepals usually exceeding the interior, 2–3.5 mm. long, linear and abruptly acute, subappressed-pilose: capsule depressed-globose, broadest toward the base, 2–2.3 mm. broad, not more than 2 mm. long; valves ovate, with 2 slight longitudinal ridges, one on each side

of the median line, marking the position of the enclosed seed; placentae and dissepiments persistent, fragile, retaining their position and structure in the mature capsule: seeds usually 6, occasionally 4, brown, smooth, with embryo not evident, uniformly rounded, dorsally angled, ventrally with one nearly flat lateral face (that next the contiguous seed), the other side (toward the dissepiment) convex.—Bull. Torr. Bot. Cl. xxi. 252 (1894); Grosser in Engler, Pflanzenr. iv[193]. 139 (1903), *Helianthemum tripetalum* Moç. & Sèss. in Dunal in DC. Prodr. i. 284 (1824). *Lechea Skinneri* Benth. Bot. Sulph. Voy. 66 (1844); Walp. Rep. Bot. v. 58 (1845–46); Hemsley in Biol. Centr. Am. i. 46 (Sept., 1879); C. Conzatti, Los Géneros Veg. Mex. 85 (1903). *L. depressa* Jones, Contrib. West. Bot. no. 18: 59 (1933).—Oklahoma (one station, Pawhuska); north-central Mexico and southern Baja California, south through the mountains of central and southwestern Mexico to Guatemala, mainly at high altitudes (600–2600 m.). Oklahoma: on dry rocky ledges, near Pawhuska, Osage Co., *G. W. Stevens*, no. 2004 (NY). San Luis Potosi: 6000–8000 ft., 1878, *Parry & Palmer*, no. 31; in montibus San Rafael, *Schaffner*, no. 604. Guanajuato: hillsides near Acambaro, *Pringle*, no. 11,923. Jalisco: thin gravelly soil of hills, near Guadalajara, *Pringle*, no. 4476; Rio Blanco, near Guadalajara, *Pringle*, no. 5171. Michoacan: vicinity of Morelia, Loma Sta. Maria, alt. 2000 m., *G. Arsène*, no. 7354 (as *L. Drummondii*); Loma Sta. Maria, alt. 2000 m., *Arsène*, no. 8584 (US) (as *L. Drummondii*); Loma Sta. Maria, alt. 2000 m., *Arsène*, no. 5973 (Mo) (as *L. Drummondii*); Jesus del Monte, Morelia, alt. 1910 m., *Arsène*, no. 3181 (US); Cerro San Miguel, vicinity of Morelia, alt. 2100 m., *Arsène*, no. 10,115 (US). Puebla: dry ground (alta Luz), Puebla, *Purpus*, no. 2744. Oaxaca: Sierra de San Felipe, alt. between 7000 and 8000 ft., *C. L. Smith*, no. 814 (NY); alt. 1750 m., *Conzatti & Gonzalez*, no. 1014 (US); Combre de Taha, 1841–1843, *Liebmann*, no. 3151 (US). Baja California: La Chuparesa, *Brandegee*, no. 16; Sierra San Francisquito, December 1, 1899, *Brandegee* (NY); the Laguna, Laguna Mountains, *M. E. Jones*, no. 27,117 (as *L. depressa*, n. sp.). Guatemala: September, 1921, *Tonduz*, no. 612 (NY); Traderas Aridas (de Guatemala), 1400 m. alt., July, 1931, *Tonduz*, no. 612 (US). Plate 489, fig. 11; map 7.

The plate of Moçino and Sesse[1] to which Dunal refers in his description[2] is without doubt a *Lechea*. The long narrow exterior sepals serve to identify it with what has usually been called *L. Skinneri* Benth. The only other Mexican species in the genus, *L. villosa* var. *Schaffneri*, has lanceolate leaves and is decidedly more densely branched and strict than is the plant in the illustration. *L. depressa* Jones is a somewhat depauperate semiprostrate plant which in all essential characters is like *L. tripetala*.

[1] Moçino & Sesse, Fl. Mex. Ic. (ined.)
[2] DC. Prodr. i. 284 (1824).

Lechea tripetala has been confused to a certain extent with *L. san-sabeana* which it resembles in size and shape of calyx, exterior sepals and capsule, length of pedicel and arrangement of fruits. This is usually secund in *L. tripetala* and always so in *L. san-sabeana*. Certain differences are equally well marked. The branching is dense in the former, sparse in the latter. The caudex, which is extensive and often decumbent in *L. tripetala*, is erect and but slightly if at all branched in *L. san-sabeana*. The pendulous fruits of the latter, which are borne on very slender pedicels 3 or more mm. long, and the persistent and firm yellow placentae and dissepiments, which partition off and partly inclose the two seeds opposite each valve, make *L. san-sabeana* utterly distinct from all others. *L. tripetala*, its closest relative, has long, often spreading pedicels and pale-red dissepiments which, though fragile, are definite and persistent structures. *L. san-sabeana* is confined to low altitudes in eastern and southeastern Texas. *L. tripetala*, except for the extraordinary occurrence at one station in Oklahoma, is found only from San Luis Potosi and southern Baja California southward into Guatemala. Many, if not all of these Mexican and Central American stations, are at altitudes of 1000 meters or more as indicated on the labels.

Lechea tripetala, with 6 (occasionally 4) seeds, is closely related to the variety *occidentalis* of *L. tenuifolia*, which has 2 seeds and smaller fruits on less spreading branches. *L. tenuifolia* and its western variety *occidentalis*, *L. mensalis* of western Texas, *L. tripetala*, mostly of Mexico, and *L. san-sabeana*, confined to areas of low altitude in Texas, constitute a well-marked division of the genus, uniformly characterized by having narrow cauline leaves and narrow basal leaves (when present), the exterior sepals longer than the interior and the capsule and calyx either depressed-globose and broadest near the base or, if elongated, with the basal part broader than the upper half. The pedicels are mostly as long as or much longer than the mature calyces and the flowers and fruits are loosely racemose along the branches (not crowded at the tip). The presence of *L. tripetala* in three widely separated areas, Oklahoma, Baja California and the mountains of central and southern Mexico and of Guatemala, indicates an early origin and spread followed by a later decline, leaving widely separated stations to mark its once considerable range and abundance. Johnston,[1] p. 966, in a discussion of the *Relationship and Origins of the Biota*

[1] Proc. Cal. Acad. Sci. xii. 966–969 (1924).

of Lower California, where *L. tripetala* is found, states of the Peninsula, "the southern two thirds has a flora clearly and definitely allied to and derived from the flora now occupying Sinaloa, southern Sonora, and the states of southern Mexico." The area mainly occupied by *L. tripetala* on the Peninsula is the Cape region of which Johnston says, l. c. pp. 968, 969. "The cape region seems to be a very old area, and appears to have escaped complete submergence since its initial elevation early in the Tertiary. During the long periods previous to the Pliocene the cape region was separated from California by a long stretch of water, for at that time the strata of the present volcanic plateau were horizontal and still under the sea. The cape region of Tertiary times was probably a larger area than now and connected for a time with the Mexican mainland. While joined easterly to the Mexican coast, the fauna and flora of that region gained access to the cape region. Among many other species the ancestors of the southerly derived reptiles, the Oryzomys, and the heavy-seeded montane trees, such as Pinus, Quercus, and Arbutus, came over on the Tertiary land connection." In matters of distribution *Lechea* probably belongs in the same category as the heavy-seeded montane trees. Its seeds, though small, are solid and perfectly smooth and therefore not adapted to wind-dissemination. Their smallness (1 mm. long) and probable scarcity make it seem unlikely that seed-eating birds have carried the species to Baja California. Its capsules are similarly not adapted to popularly conceived notions of dissemination. A land-connection would, I believe, be necessary to bring about this distribution. The presence of the plant toward the north in the Sierra San Francisquito might perhaps be explained by a later migration northward when land-connections in that direction were subsequently resumed. It seems more plausible to me to assume that here again is an instance of an area included in the early range of the species. Grabau[1] shows a land connection to have been present in Eocene time between the cape region of Lower California and the mainland of Mexico, a connection which was severed in Oligocene time. The intruding seas of that period have persisted to present time.

The tremendous "jump" of the species to the northeastern part of Oklahoma recalls the significant fact that the Ozark plateau, as noted by Fernald[2] and by Steyermark,[3] has been in continuous existence as

[1] Textbook of Geology, part 2: 801, fig. 1835 (1921).
[2] *Specific Segregations and Identities in some Floras of Eastern North America and the Old World.* RHODORA, XXXIII. 25–27 (1931).
[3] RHODORA, XXXVI. 231–233 (1934).

a land-area since the close of the Paleozoic era. Speaking of those ancient species which are restricted to the Ozark Plateau and to the adjacent area to the west and southwest, Steyermark, p. 231, states, "In some instances species originating in this area are represented slightly to the east or southeast of the main area, but have spread mostly westward and southwestward; some of this class are found as far south as the Mexican plateau or as far west as Arizona." Comparing this class with that comprising the species common to the southern Appalachians, Steyermark, p. 233, concludes that it is "a younger flora, characteristic of the uplands and barrens of the Ozarks, a flora which probably originated in Tertiary times when this region was re-elevated in late Tertiary."

Though Steyermark places the time of establishment of this class of species in the Ozark area as late Tertiary, it seems to me that, in view of the general disruption in range of *L. tripetala* and its extreme isolation in Oklahoma, it and perhaps other species mentioned by Steyermark as occurring on both the Ozark and the Mexican plateaus may well have attained their present limits of distribution in earlier Tertiary times.

(*To be continued*)

A TAXONOMIC STUDY OF LECHEA

Albion R. Hodgdon

(*Continued from page 69*)

6. L. TENUIFOLIA Michx. Caudex mostly reduced, hardly if at all branched: basal shoots 3–7 cm. long, bright-green, slender, often numerous and much branched, forming dense mats, the axis sparsely subappressed-pilose with fine hairs; leaves crowded, very numerous, glabrous, bright-green to lustrous above, subappressed- to somewhat spreading-pilose beneath on midrib and margin, narrowly lanceolate or oblanceolate to linear, 4–6 mm. long, 1 mm. or less in width, on young shoots frequently verticillate, later subapproximate or scattered: fruiting stems 1 to several, 12–40 cm. high, frequently low, openly spreading-branched mostly from below the middle, forming a subglobose to broadly spire-shaped inflorescence: young shoots and branches at first densely pilose, becoming sparsely and finely subappressed-pilose in maturity: cauline leaves scattered, linear to linear-subulate, acute, obscurely petioled, glabrous above, appressed-pilose beneath on midrib and margin, casually so elsewhere, mostly caducous, 0.8–2 cm. long, 1–1.5 mm. broad; rameal leaves much smaller, mostly persisting throughout the season: fruits racemose, frequently secund on the secondary branches, occasionally clustered, mostly subappressed: pedicels slender, mostly shorter than the calyx, 1–1.5 mm. long: calyx subglobose, broadest near the base, exceeding and completely enclosing the capsule, 1.6–1.9 mm. long; inner sepals strongly spreading-pilose, dull-green, ovate, subacute, the main vein alone prominent, forming a keel dorsally; outer sepals bright-green, leaf-like, narrowly lanceolate to linear, acute, 2–3 mm. long, 0.3–0.5 mm. broad, equaling to greatly exceeding the inner: capsule broadly ovoid, broadest near base, 1.4–1.7 mm. long, 1.3–1.5 mm. broad; valves but slightly spreading in maturity: seeds dull, yellowish- to reddish-brown, plump, broadened and greatly thickened toward the base, abruptly subacute to pointed at apex, mostly 2-sided, strongly convex dorsally, 2 in number and small (0.7–0.9 mm. long) or 3 and larger (0.9–1 mm. long or slightly longer), rarely 4–5 and ventrally keeled with 2 lateral faces.—Fl. Bor.-Am. i. 77 (1803); Pursh, Fl. Am. Sept. i. 91 (1814); Elliott, Sk. Bot. S. Car. & Ga. i. 185 (1816); Smith in Rees, Cycl. xx. (1819); Dunal in DC. Prodr. i. 286 (1824); Eaton, Man. 271 (1829); Dietr. Syn. Pl. i. 416 (1839); Leggett in Bull. Torr. Bot. Cl. vi. 251 (1878); Chapman, Fl. So. U. S. ed. 2, Suppl. 2: 678 (1892); Britton in Bull. Torr. Bot. Cl. xxi. 249 (1894); Robinson in Gray, Syn. Fl. N. Am. i^{1}. 193 (1895); Britton in Britton & Brown, Ill. Fl. ii. 443, fig. 2479 (1897); Chapman, Fl. So. U. S. ed. 3: 37 (1897); Britton, Man. 632 (1901) and subsequent editions; Small, Fl. Se. U. S. 799 (1903); Grosser in Engler, Pflanzenr. iv^{193}. 137 (1903); Robinson & Fernald in Gray, Man. ed. 7: 578 (1908); Small, Man. 882 (1933).

L. minor sensu Torrey, Fl. N. & Mid. St. 160 (1824); sensu Chapman, Fl. So. U. S. ed. 1: 36 (1860) in part; probably of other early American authors in part; not L. *L. minor* vars. β. and γ. Torrey & Gray, Fl. N. Am. i. 153 (1838); *L. minor* var. *dumosa* Torrey, Fl. N. Y. i. 79 (1843). *L. thesioides* Spach in Hook. Comp. Bot. Mag. ii. 285 (1836). *L. secundiflora* Rafinesque, New Fl. N. Am. i. 95 (1836).—Rocky or dry woods and hills, mostly inland, and on foothills and lower mountains of the Appalachian System and on the Ozark Plateau: southern Maine and New Hampshire (where rare) to South Carolina, west to southeastern Minnesota, eastern Nebraska, Kansas, Oklahoma and Texas. Because of the sharply defined character of this species throughout the Eastern States it is quite unnecessary to indicate specimens from this area. In Illinois, where the var. *occidentalis* occurs, and in the states west of the Mississippi River, where the possible occurrence of the variety could lead to misidentifications, I shall include representative specimens. Illinois: Oregon, Ogle Co., September 23, 1887, *M. B. Waite* (US); dry sandy soil, common, Braidwood, July, 1927, *Clute* (NY); dry sandy slopes or rocky banks, St. Peter's Sandstone, Utica, July 13, 1901, *E. J. Hill*, no. 137; sandy opens, Starved Rock Park, *F. W. Johnson*,. no. 1926 (NY); sand hills, Kankakee, July 25, 1873, *E. J. Hill* (NY); sandy barrens near Oquawka, May and October, 1874, *Patterson* (Field); sandy soil, Athens, Mason Co., 1861, *E. Hall* (Field); in woods on dry bluff, Cedar Glen, Hancock Co., *F. C. Gates*, no. 10,112 (Field); open ground, sterile soil, Parkersburg, Richland Co., *E. J. Palmer*, no. 15,624 (Mo); rock-barrens, Makanda, June 12, 1903, *Gleason*. Minnesota: opposite Hudson, Wisconsin, St. Croix River, July 22, 1890, *Holzinger* (NY). Iowa: Wild Cat's Den, Mount Pleasant, Muscatine Co., August 1891, *J. H. Mills;* dry soil, infrequent, Van Buren Co., August 1, 1896, *J. T. & M. F. L. Fitzpatrick* (Field). Missouri: River Heights, near Hannibal, Marion Co., July 23, 1919, *J. Davis* (Mo); dry open woods, east of Bethel, Shelby Co., June 29, 1933, *Palmer & Steyermark*, no. 40,910 (NY); sandy woods, local, south of Sui Mills, Jackson Co., *Mackenzie*, no. 515 (NY); Pacific, *E. E. Sherff*, no. 995 (Field); Bismark, September 10, 1893, *Bush* (Mo); on dry sandy roadsides, Vernon Co., July 16, 1873, *G. Broadhead* (Mo); Shannon Co., July 24, 1891, *Bush* (Mo); post-oak woods, vicinity of Strafford, Greene Co., *P. C. Standley*, no. 9431 (US); common in sandy and dry soil, 13 miles northwest of Joplin, *E. J. Palmer*, no. 266; common, Montier, *Bush*, no. 56 (NY); Poplar Bluffs, August 15, 1875, *Letterman* (Mo); dry open woods, Willow Springs, Howell Co., *E. J. Palmer*, no. 6229 (Mo); dry soil, McDonald Co., *Bush*, no. 17A. Arkansas: dry open ground, Beaver, Carroll Co., *E. J. Palmer*, no. 6369 (Mo); Benton Co., 1899, *Plank* (NY); dry sandy slopes, London, Pope Co., *E. J. Palmer*, no. 8163 (NY); Big Creek, Sebastian Co., *Demaree*, no. 3125 (US); Fort Smith, 1853–54, *J. M. Bigelow* (US); dry open woods, Pulaski Heights, Little Rock, Pulaski Co., *Demaree*,

no. 8121; moist flat woods, Fulton, Hempstead Co., *E. J. Palmer*, no. 12,679 (NY); near Texarkana, Miller Co., alt. 300 ft., *A. A. & E. G. Heller*, no. 4154. LOUISIANA: dry woods, Natchitoches, June 10, 1915, *E. J. Palmer*, no. 7948 (NY); hill top at Fort Bulow, vicinity of Alexandria, *C. R. Ball*, no. 538; vicinity of Covington, *G. Arsène*, no. 11,816 (US). KANSAS: Galena and vicinity, 8 miles south of town, *Rydberg & Imler*, no. 272 (NY). OKLAHOMA: vicinity of McAllister, May 16, 1883, *Oyster* (Mo); open sandy land, near Grant, Choctaw Co., *H. W. Houghton*, no. 4017. TEXAS: dry prairies, Bowie Co., June 13, 1898, *Eggert* (NY); in sandy woods, Greenville, June, 1913, *D. A. Saunders* (NY); near Paris, Lamar Co., *A. A. & E. G. Heller*, no. 4213 (US); common on hills, Marshall, *Bush*, no. 1013 (Mo); Comanche Spring, June, 1849, *Lindheimer*, no. 678: Weatherford, *Tracy*, no. 8059 (Mo); Troup, June 8, 1927, *L. McGregor*, no. 7183 (US); sandy woods, Granbury, *Reverchon*, no. 52 (Mo); Hempstead, *E. Hall*, no. 32; prairie, near Houston, June, 1892, *Lindheimer;* New Braunfels, June, 1850, *Lindheimer*, no. 677. PLATE 489, FIGS. 5, 6 and 7; MAP 8.

Var. **occidentalis**, var. nov. Habitu varietati typicae similis sed parum robustior ramis erectioribus; folia basilaria et caulina viridia sed opaciora et dorso densius pilosa; fructus latior et longior; sepala interiora 1.9–2.2 mm. longa; sepala exteriora interiora valde superantia; capsula 1.7–2.1 mm. longa late ovoidea vel elongato-ovoidea; valva sepala interiora subaequans; semina 2–4 (plerumque 2) pallide brunnea crassa magna (1–1.2 mm. longa) ca. 0.55–0.7 mm. lata parum inaequilateralia dorsiventraliter compressa.—Dry woods, sandy places and rocky slopes, south-central Nebraska, central Kansas and Oklahoma to central and eastern Texas but not on the Coastal Plain, also in several scattered localities in northern Illinois. I have seen the following specimens. ILLINOIS: Fountaindale, Winnebago Co., *Bebb* (Field); Dixon, *Vasey;* in sandy woods, Peoria, July, 1895, *F. E. McDonald* (Mo). NEBRASKA: Minden, September, 1897, *Hapeman* (NY). KANSAS: Pottawatomie Co., August 30, 1895, *J. B. Norton*, no. 30 (TYPE in Gray Herb.); sandy hills, St. George, August 13, 1895, *Norton*, no. 375 (NY); Stafford Co., *M. A. Carleton*, no. 299 (US). OKLAHOMA: on dry rocky ledges, near Pawhuska, Osage Co., *G. W. Stevens*, no. 2004; common, Sapulpa, Indian Territory, *Bush*, no. 1357 (NY); dry rocky sandy clay cliff, 1 mile west of Oilton, Payne Co., *R. Stratton*, no. 89 (Mo); Lincoln Co., July 26, 1895, *L. A. Blankinship;* roadside, 1 mile south of Luther, Oklahoma Co., *R. Stratton*, no. 271 (Mo); 3 miles west of Kendrick, July 19, 1905, *A. H. Van Vleet* (US); Pottawatomie Co., August 8, 1900, *P. J. White*, no. 91 (Mo); Davis, *W. H. Emig*, no. 674 (Mo); chiefly on the False Washita between Fort Cobb and Fort Arbuckle, Indian Territory, 1868, *Edw. Palmer* (NY); on mountain side, near Cache, Comanche Co., *G. W. Stevens*, no. 1336½; gravelly soil among rocks, Wichita Mountains, Indian Territory, *C. G. Sheldon*, no. 205 (Mo). TEXAS: on the Sabi-

nas, on rocks, July, 1847, *Lindheimer* (Mo); in sandy pasture land, growing with *L. villosa*, Tarrant Co., *Ruth*, no. 399 (NY); rocks, Palo Pinto Co., August 17, 1877, *Reverchon*, no. 782 (NY); on sandstone rocks, Stephens Co., August 17, 1877, *Reverchon*, no. 782; on sandstone rocks, Eastland Co., August, 1876, *Reverchon*, no. 2320 (Mo); granite glades, Granite Mountain, Burnet Co., *E. J. Palmer*, no. 10,267 (Mo); Enchanted Rock, Llano Co., June 1, 1930, *Tharp & Whitehouse*, no. 86,950 (mixed with *L. san-sabeana* and distributed as *L. tenuifolia*). Plate 489, figs. 8 and 9; map 9.

On the basis of the type-specimen which is preserved in the Michaux Herbarium at Paris, the name *Lechea tenuifolia* stands for the plant under present consideration. Fernald, in 1903, saw the specimen and reported it to agree with our *L. tenuifolia*.

Elliott[1] cites "*L. juncifolia?* Walt." as a synonym of *L. tenuifolia*. Walter's description[2] is as follows, "foliis radicalibus teretibus, calyce nullo"; and *Index Kewensis* cites *L. juncifolia* as a synonym of *L. tenuifolia*, despite the fact that Torrey & Gray,[3] after quoting Walter, quite logically say it "is wholly unknown but doubtless belongs to some other order." Grosser,[4] in his treatment of *L. tenuifolia*, follows *Index Kewensis* in citing *L. juncifolia* and, in addition, he cites as a synonym Rafinesque's *L. verna*, which was not described in the latter's monograph[5] but only cited as a name, l. c. p. 92, along with *L. juncifolia* as a synonym of *L. tenuifolia* Michaux. All three of these Rafinesque includes in the subgenus "*Menandra*," which he describes, l. c. p. 90, as having, "2 short sepals or almost lacking," consequently having nothing to do with our *L. tenuifolia*. Rafinesque does, however, l. c. p. 95, describe *L. secundiflora*, which can hardly be anything else. Part of the description I quote, "leaves scattered, lax narrow linear . . . flowers remote secund, pedicels short." It is placed by Rafinesque in his subgenus *Eudiexa*, which has the external sepals longer than the internal. All of these characters belong to *L. tenuifolia* and the remainder of the description is not conflicting. Therefore the name belongs in the synonymy of *L. tenuifolia*.

Spach's description[6] of *Lechea thesioides* is exceptionally complete and accurate and his species belongs obviously to our *L. tenuifolia*.

[1] Sk. Bot. S. Car. & Ga. i. 185 (1816).
[2] Fl. Car. 83 (1788).
[3] Fl. N. Am. i. 154 (1838).
[4] Engler, Pflanzenr. iv[193]. 137 (1903).
[5] New Fl. N. Am. i. 89–98 (1836).
[6] Hooker, Comp. Bot. Mag. ii. 285, 286 (1837)

Lechea minor vars. β. and γ. of Torrey & Gray[1] are by their descriptions probably *L. tenuifolia.* However, there are specimens of *L. tenuifolia* labeled *L. minor* var. γ. in the Herbarium of the New York Botanical Garden; and presumably the type-specimen of this variety, mentioned as *L. tenuifolia* by Britton, is one of these, but among the specimens of *L. racemulosa* there are plants labeled *L. minor* var. *gracilis,* which is the name later given by Torrey[2] to the earlier var. α.

L. tenuifolia, while fairly constant in general habit and leaf-characters, varies strikingly in the seeds and capsules. Generally speaking there are two types, a smaller-seeded and -fruited form and one with larger fruiting parts. Both occur sporadically anywhere in the range, having no distinct ranges or other morphological characters which would enable one to split the species. A similar type of variation exists in *L. maritima* var. *typica;* and there again the two slightly differing types of plants permit of no classification along evident lines of geographical variation.

In and close to the Driftless Area and on the Great Plains and rolling uplands of Nebraska and from central and eastern Kansas to central Texas there occurs a distinct variety of *Lechea tenuifolia.* It differs from the typical form of the species in its woody and more extensive caudex, in its more striking pilosity (both of cauline and basal leaves) and particularly in its very long exterior sepals, large capsules and seeds. Its occurrence in northern Illinois in or near "the Driftless Area," at least 400 miles from the nearest station to the west, is particularly interesting. These Illinois stations (Winnebago Co., Dixon and Peoria) are included in the area which was covered by the Illinoian but not by the Wisconsin Ice.[3] Moreover, the first two stations are but a short distance, 30–50 miles, from "the Driftless Area." Reference to Antevs' map shows that the position of St. George, Kansas, the nearest station to the west, is on the border between the Kansan Drift and the entirely unglaciated area of the South and West where the remaining stations are located. The distribution appears to be definitely correlated with lack of glaciation and at the same time with a dry climate, since the variety is absent from southern Illinois and Missouri. The spread of the variety must

[1] Fl. N. Am. i. 153, 154 (1838).
[2] Fl. N. Y. i. 79 (1843).
[3] E. Antevs, Maps of the Pleistocene Glaciation in Bull. Geol. Soc. Am. xl. 645, fig. 6 (1929).

have taken place before the Wisconsin; otherwise it would occur in suitable intervening areas. That it survived the entire Pleistocene in the Driftless Area is also possible. At least, in the western part of its range it has failed to move far, even on to the Kansan Drift. Its very scattered distribution over a considerable area indicates, likewise, a considerable antiquity.

7. L. **mensalis**, sp. nov. Caudex plerumque simplex; rami basilares subprocumbentes vel adscendentes, 1–4 cm. longi dense subadpresseque pilosi; folia basilaria 3–5 mm. longa anguste linearia supra glabra subtus subadpresse pilosa praecipue in costa; folia caulina anguste linearia acuta 8–15 mm. longa 0.7–1.2 mm. lata subtus costa et margine sparse patuleque pilosa; caules floriferi numerosi 15–25 cm. alti graciles sparse patulo-pilosi praecipue supra medium ramosi, rami simplices vel furcati; fructus in racemos densos dispositi; pedicelli adpressi vel patuli 1.5–2 mm. longi subadpresse pilosi; calyx fructifer ovoideus 1.9–2 mm. longus 1.5–1.7 mm. latus capsulam superans et tegens; sepala interiora dense subadpresseque pilosa obscure carinata; sepala exteriora anguste linearia interiora aequantia; capsulae inaequilateraliter ovoideae subangulatae 1.6–1.8 mm. longae 1.2–1.3 mm. latae valvae subaequales obscure carinatae; semen 1, 1 mm. longum subaequilateraliter ovoideum sub apice dorsiventraliter compressum.—A single station in the Chisos Mountains of southwestern Texas. Texas: Chisos Mountains, July 28, 1931, *C. H. Mueller*, no. 8102 (type in Gray Herb.), distributed as *L. tenuifolia* Michx. Plate 489, figs. 1, 2, 3, and 4; map 10.

Lechea mensalis, while represented in herbaria only by the collection cited above, is one of the very distinct members of the genus. Its slender panicles of strongly ascending branches serve, at once, to separate it from the broadly spreading-branched *L. tenuifolia* or from the more strict *L. tenuifolia* var. *occidentalis*. Since the two latter have from 2–3 seeds borne in capsules which are about as broad as long, the contrast with *L. mensalis* becomes more marked, for it has a narrowly ovoid capsule bearing but 1 seed. That it is related to *L. tenuifolia* is shown by a combination of characters rather than by any single striking characteristic. *L. mensalis* has fruits borne on fairly long pedicels and arranged uniformly in racemes, calyces and capsules broader below the middle than above, cauline and basal leaves very narrow and the exterior sepals about equal in length to the inner.

The Chisos Mountains of southwestern Texas, where this *Lechea* was collected in 1931 by *C. H. Mueller*, are noted for the endemism and the breadth of relationship of their flora. They attain a sufficient

elevation to support on their flat summits a flora quite different from that of the surrounding desert areas. In the latter part of June, 1934, Mr. G. B. Rossbach and I climbed nearly to the plateau-like summit of Emory Peak (the highest point in the Chisos Mountains). At the point (slightly less than 2500 meters altitude) where we were forced by approaching darkness to turn back, the terrain, becoming mesophytic, began to appear suitable for the growth of Lecheas. It is probable that the specimen came from the extensive summit, in which case it would mark the upper limit in altitude for any member of the genus.

It seems very probable, in view of the very diversified geographic elements in the flora of these mountains, that their floristic history extends back many millions of years. *Lechea mensalis* is a single instance to suggest the antiquity of that flora.

The reduction of seeds per capsule to 1 is matched in the east by *L. patula*, *L. Deckertii*, *L. divaricata*, *L. cernua* and in a small proportion of capsules of *L. racemulosa*. The last, usually with 2 seeds but occasionally with only 1 in a capsule, has a broad range on the Coastal Plain and in the southern Appalachian Mountains. *L. patula* extends north from Florida to South Carolina. The remaining three species are confined to restricted areas in the Florida Peninsula. Of the species in the genus having numerous (3–6) seeds per capsule, *L. intermedia*, *L. villosa* (except var. *Schaffneri*), *L. minor*, *L. Leggettii* var. *typica*, *L. tenuifolia* (except in var. *occidentalis*), *L. Torreyi*, *L. maritima* (except in var. *virginica*) and *L. tripetala*, are the dominant species over most of the range of the genus. A reduction in the number of seeds appears almost to be an invariable accompaniment of extensive curtailing of range, since of very localized species only *L. san-sabeana* and *L. cubensis* (which is little known) have more than 1 or 2 seeds. Moreover, *L. san-sabeana*, which by the development of persistent and hard dissepiments has retained the potential capacity to produce 6 seeds, rarely produces perfect mature ones. The Florida species, *L. Deckertii*, *L. divaricata* and *L. cernua*, have developed extremely hard capsules which remain closed in maturity and in which there has even been a growing together of the valves of the capsule. Because these species grow in geologically ancient areas or in areas having old floras and are cut off by wide areas from their relatives or, as in some cases, are so distinct that it is difficult to say to what species they are related, I am of the opinion that the 1-seeded condi-

tion, possessed by them, is a natural consequence of segregation, specialized adaptation and old age.

8. L. Deckertii Small. Plant low, 7–28 cm. high, pale-green, broadly globose- to subcylindric-paniculate, with fine wiry branches, mostly suffruticose, only the upper branches and the tips of the stem regularly dying back at the end of the season: true basal shoots lacking, the young shoots starting from any part of the shrubby plant: leaves of the young shoots linear, abruptly acute or obtuse, sparingly subappressed-pilose beneath on midrib and margin, glabrous above, 1.5–3.5 mm. long; leaves of the developing shoots crowded, numerous, similar, conspicuously pilose beneath, 3–6 (–7) mm. long; those of the mature shoots inconspicuously pilose on midrib and margin beneath, 1.5–5 mm. long, of the ultimate branches persistent, 1.5–2.5 mm. long: flowers scattered, few to fairly numerous: fruit maturing irregularly, scattered: pedicels slender, weak, 1–2 mm. long, sparsely and finely pilose to glabrous: calyx broadly (nearly horizontally) spreading, not at all enclosing the capsule; interior sepals elliptic-ovate to elliptic-obovate, obtuse, deeply concave, sparsely and finely pilose to glabrous, 1–1.2 mm. long; exterior sepals linear, from one-half to two-thirds as long as the inner: capsules lustrous, prominent, free from the calyx, subglobose, as broad as long, 1.2–1.5 mm. in diameter; the valves papery, not readily separating in maturity: seeds 1 (2), 0.8–1 mm. long, much enlarged at the base, the axis greatly curved, unequally 3-sided, the two lateral faces very unequal.—Torreya, xxvii. 103 (1927) and Man. 884 (1933). *L. myriophylla* Small, Man. 884 (1933).—Sand-hills and scrub, inland, south-central Georgia to southern Florida. The following are typical. Georgia: sand-hills of Seventeen Mile Creek, Coffee Co., *Harper*, no. 1461; sand-hills of Satilla River, Coffee Co., *Harper*, no. 1443 (NY). Florida: scrub, Tavarese, June 29, 1893, *Rolfs* (Field); Killarney, September, 1889, *O. Vesterland* (US); sand-hills about Lake Jackson, *Small, Small & DeWinkeler*, no. 10,643 (NY); dunes, Highlands Co., August 29, 1934, *M. E. Baker* (NY) (as *L. myriophylla*); east of Sebring, De Soto Co., *Small & DeWinkeler*, no. 9772 (NY), the type of *L. myriophylla* Small; scrub, near Kuhlman, DeSoto Co., *Small & DeWinkeler*, no. 9799 (NY), as *L. myriophylla;* scrub, near Lemon City, *Small, Small & DeWinkeler*, no. 10,324 (NY); scrub, Lemon City, Dade Co., July, 1926, *R. F. Deckert* (type, Herb. N. Y. Bot. Gard.). Plate 489, fig. 10; map 11.

The relationship of *Lechea Deckertii* is definitely with *L. patula*. The general habit and the leaves of both are similar. Furthermore, both have certain similarities of the fruits which are of diagnostic importance. The capsule of each is exserted far beyond the calyx which, in either species, is much reduced in size. The differences, however, are several of a fundamental nature. *L. Deckertii* has a

broadly spreading calyx of short exterior sepals and longer interior ones. The capsule is nearly globose and has thin papery valves. *L. patula* has a somewhat spreading to nearly appressed calyx of long exterior sepals and equal or shorter interior sepals, and the capsule is elongate-ovoid or elongate-obovoid, with firm to indurated valves.

The difficulty in identifying specimens of *Lechea Deckertii* is as great as in *L. patula*. Both species pass through similar stages of development of vegetative parts wherein strong contrast is shown between early and late conditions. Here, as in *L. patula*, Small has described as a new species a plant, in this case *L. myriophylla*, distinguished mainly on characteristics of the shoots during a period of strong vegetative development.

In the descriptions of *Lechea myriophylla* and *L. Deckertii*[1] the following differences are given: the leaves of the former are stated to be "3–5 mm. long, acute and somewhat loosely strigose or glabrous," those of the latter "1.5–2.5 mm. long, acutish, glabrous or nearly so." *L. Deckertii* is further described "panicles few–several flowered"; *L. myriophylla* as having "panicles many flowered"; finally the sizes of the capsules are given as "1.2–1.4 mm. long" for *L. Deckertii* and as "1.5 mm. long" for *L. myriophylla*.

From my comparisons of the type-specimens of *Lechea Deckertii* and *L. myriophylla* with many other sheets of *L. Deckertii* from several herbaria I find that *L. myriophylla*, the more recently described species of Small, represents merely a phase of *L. Deckertii* wherein a very considerable growth has taken place in the young shoots, accompanied by the development of comparatively large leaves. This is parallel with the situation in *L. patula*, in which different states of development of one species have led to the increase of useless synonyms. *L. Deckertii* varies, as might be expected, in the quantity of pubescence on the leaves. Some specimens, agreeing in most respects with Small's strict definition of that species, have leaves as strongly pilose as are those of his *L. myriophylla*. The size of capsules is similarly variable. I have seen no flowering or well developed "fruiting panicles" of *L. myriophylla* but those of *L. Deckertii* are frequently many-flowered.

The status of *Lechea Deckertii* as a distinct species is unquestionable. The characters of the few mature seeds which I have found in the capsules in conjunction with the other characteristics attest this.

[1] Small, Man. 884 (1933).

The one character (not mentioned by Small) which seems to support his *L. myriophylla* is its nearly glabrous calyx. But this character is not very reliable: in the New Jersey Pine Barrens several specimens have been collected of *L. Leggettii* var. *moniliformis* with perfectly glabrous calyces but in all other respects similar to characteristic specimens of that variety. Because of its sporadic occurrence in two separate species, unaccompanied by other and fundamental differences, I regard the total or almost complete loss of hairs from the calyces as a mutation which is confined to but a few plants and which will probably persist for only a short time within a species or variety. Several others of the rather limited number of specimens of *L. Deckertii* now to be found in herbaria could be thoroughly described as individuals (stressing the vegetative characters) to make about as distinct species as does *L. myriophylla* Small.

9. L. DIVARICATA Shuttleworth. Plant subherbaceous, the caudex multicipital, mostly subprocumbent: basal resting shoots lacking; the young shoots in late spring or summer mostly from near the base, immediately developing, densely villous on the axis: basal leaves few, scattered, alternate, densely villous beneath on midrib and margin, mostly glabrous above, lance-ovate to elliptic-lanceolate, acute to pointed, 2–3 mm. long: fruiting stems frequently numerous, slowly developing, mostly dying after fruiting, 25–60 cm. high, divergently and somewhat divaricately branched from near the base; the principal branches 15–30 cm. long: leaves absent from the main stem, abundant and crowded, mostly spreading on the branches, spreading-pilose to villous on the lower surface on midrib and margin, glabrous above, narrowly lance-ovate to elliptic-lanceolate, acute, 5–8 mm. long: secondary branches very short, mostly 1–3 cm. long, becoming little more than fruiting clusters upward: stamens numerous (15–25): fruits loosely to compactly clustered: pedicels stout, densely subappressed- to spreading-pilose, 1–1.5 mm. long: calyx strongly pyriform, broadly spreading above the very considerable (5–8 mm. long), pale obconic receptacle; interior sepals elliptic-ovate, obtuse, spreading-pilose to villous, 1.3–1.5 mm. long; exterior sepals narrowly lanceolate, two-thirds as long as the inner: capsule exserted, considerably exceeding the calyx, elliptic-ovoid, 1.8–2 mm. long, 1.6–1.7 mm. broad, lustrous; the valves indurated (very hard), coalesced, neither sharply defined nor separable in maturity: seeds 1–3 (–4), mostly 1 normal and mature, the others aborted and shrunken, 1.2–1.4 mm. long, mahogany-brown, with a thin white covering, broadest at the base, narrowing unequally upward to the apex, irregularly convex dorsally, concave to obscurely 2-faced ventrally, the endosperm dense, obscuring the embryo.—Shuttleworth ex Britton in Bull. Torr. Bot. Cl. xxi. 249 (1894); Small, Fl. 799 (1903) and Man. 883 (1933). *L.*

major var. *divaricata* Gray in Robinson in Gray, Syn. Fl. N. Am. i[1]. 192 (1895); Grosser in Engler, Pflanzenr. iv[193]. 137 (1903).—Sandy soil, mostly near the coast, central and southern Florida. The following specimens have been seen by me. FLORIDA: in dry sandy soil, Sanford, June 28, 1920, *S. Rapp* (NY); dry sandy soil, Eau Gallie, Indian River, *Curtiss*, no. 5709; Hernando Co., June–July, 1898, *A. S. Hitchcock* (Field); St. Petersburg, August, *C. S. Williamson* (NY); Manatee, June, 1878, *Garber;* in pinetis ad fl. Manate—Florida austr. occ., *Shuttleworth* (TYPE in Gray Herb.). PLATE 490, FIG. 1; MAP 12.

This very distinct species of *Lechea* has been variously misunderstood by students of the genus. Leggett,[1] speaking of *L. major*, our *L. villosa* Ell., said "I suspect the *L. divaricata* Shuttleworth from Florida is only a form of this with many stamens, 30 or more." Britton,[2] after briefly describing the plant, said, "I have not seen the radical shoots and am consequently uncertain of the alliance of the species but think there is little doubt of its near relationship to L. villosa." Among the specimens he cites is one from Texas, "*E. Palmer*, no. 2025." Robinson,[3] following Gray, made the combination *L. major* var. *divaricata* and cited among other specimens "Texas, *Palmer*" and "Mex., *Schaffner*" as belonging to it. Grosser, largely following Robinson's treatment, called the plant *L. major* var. β. *divaricata* and included Palmer's collection, no. 2025, from Texas, but eliminated the Mexican material of Schaffner. Small[4] gave the range as "Florida and Texas" and very recently[5] stated the range, "pen. Fla., also reported from Tex."

Probably a half-dozen differences exist between *L. villosa* and *L. divaricata*. The most distinguishing characters lie in the fruits and these are of a more fundamental order than are to be found among any of our northern Lecheas. First and most important, the capsule, which greatly exceeds the calyx, is extremely hard and indehiscent, the valves having quite coalesced. The one seed (occasionally more) is dark-brown, with a membranaceous coat, irregularly ovoid and very large. The leaves are always very small, never reaching 1 cm. long. It would be difficult to find any *Lechea* differing more from *L. villosa* in everything except quality of pubescence and the general shape of the leaves, both of which are vegetative characters and not in them-

[1] Bull. Torr. Bot. Cl. vi. 251 (1878).
[2] Bull. Torr. Bot. Cl. xxi. 249 (1894).
[3] Gray, Syn. Fl. N. Am. i[1]. 192 (1895).
[4] Fl. Se. U. S. 799 (1903).
[5] Man. 883 (1933).

selves necessarily indicative of close relationship. All of the authors mentioned above regarded pubescence in the genus as being of great importance. The obvious thing for them to do, then, was to relate the two species having strongly villous pubescence. The equally obvious consequence has been the inclusion in the species *L. divaricata* of certain peculiar growth-forms of *L. villosa*, the Texan specimen of *Palmer*, no. 2025, for example. Nothing but hopeless confusion will ever result from a classification of these plants by their vegetative characteristics alone.

In characters of fruit this species is closest to *Lechea Deckertii* and *L. patula*, all three having usually 1-seeded capsules which in the first two are of coalesced valves. *L. patula* has the valves partly united. The specialization, consisting of reduction in number of seeds and coalescing of valves, arrived at in *L. divaricata* probably accounts for the fact that it is not common.

10. L. RACEMULOSA Michx. Caudex short, mostly simple; basal shoots in August and September, spreading-ascending to suberect, in maturity frequently branched, 3–8 cm. long; the axes strongly spreading-pilose: basal leaves frequently verticillate, bright-green, thin, oblong-ovate to elliptic-lanceolate, acute to slightly mucronate, 4–6 mm. long, 1.5–2.5 mm. broad, on the lower surface subappressed- to spreading-pilose along the midrib and prominently spreading-pilose to villous on the margin, glabrous above: fruiting stems several, 25–40 cm. high and loosely to compactly paniculate-branched, or one 10–15 cm. high, globular-paniculate and very leafy-branched; the axis sparingly and minutely pilose: primary branches spreading to ascending, diminishing upward; secondary branches scattered, slender: cauline leaves acute to slightly mucronate, at first narrowly elliptic-lanceolate, becoming narrowly oblanceolate; rameal leaves acute and narrowly lanceolate to linear, acute, sparsely subappressed-pilose beneath on midrib and margin: fruits scattered-racemose on the secondary branches: pedicels filiform, sparsely and finely subappressed-pilose to glabrous, 1.5–3.5 mm. long, usually slightly exceeding the calyx: calyx narrowly pyriform, sparingly to strongly subappressed-pilose, 1.8–2 mm. long, slightly more than half as broad; interior sepals narrowly elliptic to spatulate, subacute to obtuse; exterior sepals narrowly lanceolate or linear, considerably shorter than the inner: capsule equaling to slightly exceeding the calyx, slenderly ellipsoid to slenderly ovoid, 1.7–1.9 mm. long, 1–1.2 mm. broad, often distinctly inequilateral: seeds 1–3, mostly 2, 1–1.3 mm. long, about half as broad, dark-brown, the embryo not visible through the endosperm, oblong-ovoid, nearly equilateral, dorsiventrally compressed, the dorsal surface slightly rounded-convex, the ventral surface flattened.—Fl. Bor.-Am. i. 77 (1803); Pursh, Fl. Am. Sept. i. 91 (1814); Elliott,

Sk. Bot. S. Car. & Ga. i. 184 (1816), in part; Smith in Rees, Cycl. xx. (1819); Torrey, Fl. N. & Mid. St. 161 (1824); Dunal in DC. Prodr. i. 285 (1824); Torrey, Comp. Fl. N. & Mid. St. 74 (1826), in part; Leggett in Bull. Torr. Bot. Cl. vi. 251 (1878); Chapman, Fl. So. U. S. ed. 2. Suppl. 678 (1892); Britton in Bull. Torr. Bot. Cl. xxi. 248 (1894); Robinson in Gray, Syn. Fl. N. Am. i[1]. 195 (1895); Britton in Britton & Brown, Ill. Fl. ii. 442, fig. 2476 (1897); Chapman, Fl. So. U. S. ed. 3: 37 (1897); Britton, Man. 632 (1901); Grosser in Engler, Pflanzenr. iv[193]. 135, fig. 22, A–M (1903); Small, Fl. 798 (1903); Robinson & Fernald in Gray, Man. ed. 7: 579 (1908); Stone, Pl. So. N. J. 562, pl. 83, fig. 2 (1911); Small, Man. 883 (1933). *L. minor* α. Torrey & Gray, Fl. N. Am. i. 153 (1838). *L. minor* var. *gracilis* Torrey, Fl. N. Y. i. 79 (1843). *L. minor* of many early American authors, in small part; not L.—Sandy fields and barrens of the Coastal Plain and slopes and summits of the southern Appalachian Mountains, tolerant of limestone, Georgia to Missouri, north to southeastern New York, Pennsylvania, West Virginia and Indiana. The characters of *L. racemulosa* are sufficiently distinct to make unnecessary the citation here of representative specimens. Map 13.

The name *Lechea racemulosa* has been attributed variously to Michaux and to Lamarck. The Michaux description is quite satisfactory for the species. Furthermore, there is a type-specimen in the Michaux Herbarium which is mentioned by Britton.[1] Lamarck has been given the credit for the name on the basis of the date 1793 on the title page of Tome ii. "Tableau Encyclopédique et Méthodique." According to a note of C. Davies Sherborn and B. B. Woodward,[2] Tome ii.[2] 137–551, with title-page dated 1793, was published in 1819, their source of information being Bibl. Franc. Nov. 6, 1819: 513 (1819). The description of *L. racemulosa* was on page 423 in this volume. Here there is reference to an illustration[3] which was published in 1797, a figure of a *Lechea*, placed wrongly with *Gaura*. Lamarck stated that the illustration applied to *L. racemulosa*, at the same time referring back to "Dict. Suppl. no. 2" (*i. e.* the second species under *Lechea*),[4] where the name is ascribed to Michaux. I should have to take his word, however, for the identity of the subject of the illustration, since no specific characters are delineated. It is the same, or worse, with all of Lamarck's illustrations of *Lechea*.

The distribution of *Lechea racemulosa* shows it to be a settled and presumably very old species. It is decidedly abundant on the sum-

[1] Bull. Torr. Bot. Cl. xxi. 248 (1894).
[2] Annals and Magazine of Natural History, June (1906); partially repr. in Journ. Bot. xliv. 318–320 (1906).
[3] Lam. Rec. de Planch. Bot. de l'Encycl. ii. pl. 58 (1797).
[4] Encycl. Method. Suppl. iii. 340 (1813).

mits and slopes of the high Appalachians and almost equally prominent on the Coastal Plain. That its present range is not of recent origin is shown by its presence only in or very close to areas generally considered to have escaped continental glaciation during the Pleistocene. The one exception to this is the station at the southern end of Lake Michigan in Indiana. The fact that several other species of *Lechea*, otherwise rare in or absent from supposedly glaciated areas, are found here and at times also along the shore of Lake Erie, points to the obvious conclusion that the distribution around the Great Lakes was attained at some time long previous to the present, during some phase of the Wisconsin ice-advance or even before the Wisconsin.

The characters of *Lechea racemulosa* are very constant, as much so, in fact, as those of *L. minor*. On the Coastal Plain, on the Appalachian summits and on the dunes of Lake Michigan there are no perplexing forms or trivial variations, of which we find an abundance in most of our northern species.

Although both distribution and constancy of characters indicate a considerable antiquity for the species, the characters in most cases seem to be derived ones, the reduction of seeds per capsule to one or two for example. It is apparent throughout the genus, in fact, that those species which are obviously derived from a primitive type, either by great reduction or by coalescence of parts or by prominent modification of parts, are found in definitely ancient floristic areas. The unmodified primitive characters, on the other hand, are, generally speaking, possessed by several wide-ranging species, rejuvenated in glaciated America.

11. L. CERNUA Small. Plant with an extensive branching caudex or commonly suffruticose and with most of the principal branches persisting: basal shoots lacking; the shoots borne frequently far below the middle, reaching nearly full size and extensively branching (but not fruiting) the first season, in maturity spreading-ascending, 20 or more cm. long, their axes and those of the branches densely and somewhat divergently pilose: leaves decidedly heteromorphic, crowded; the earliest small, about 0.5 cm. long, not more than half as broad, densely spreading-pilose on both surfaces; the later comparatively large, thick, 0.5–1.2 cm. long, often nearly as broad, elliptic-ovate to orbicular, acute- to mucronate-tipped, densely subappressed- to spreading-pilose or subtomentose on both surfaces; those of the mature branches narrowly elliptic-ovate, narrowing gradually to the acute or pointed tip, less than 1 cm. long, densely pilose to subtomentose below, pilose above with more scattered hairs: fruits sparse, in open fascicles of a few each at the tips of and along the short fruiting

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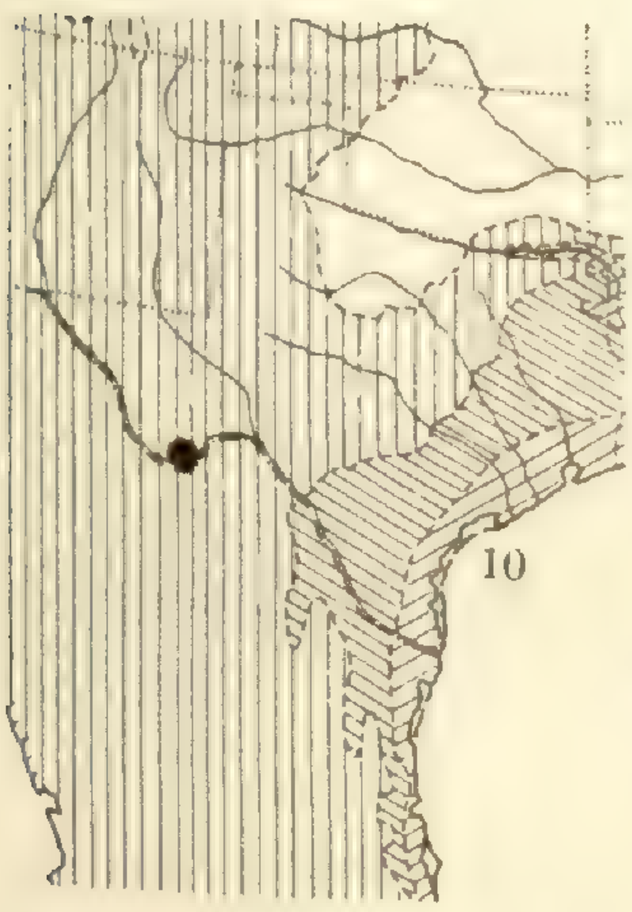
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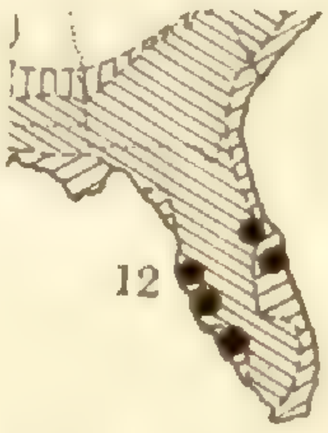
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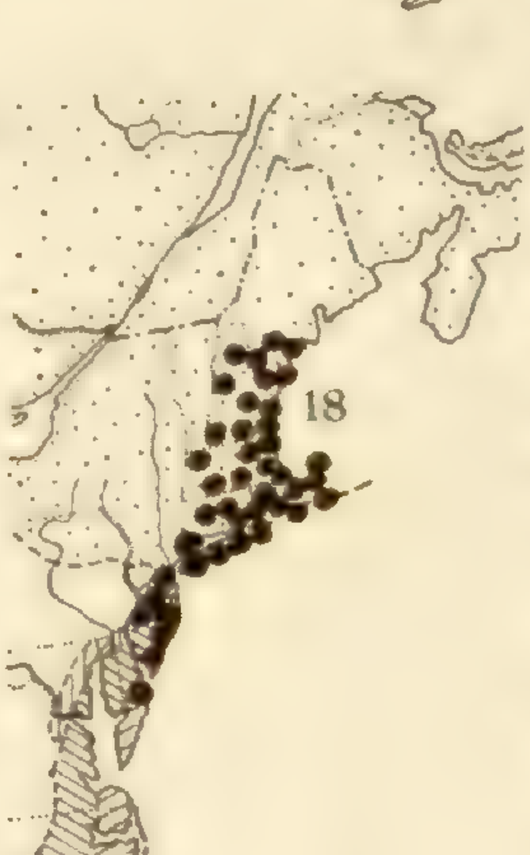
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Map 8, range of Lechea tenuifolia; 9, of L. tenuifolia, var. occidentalis; 10, of L. mensalis; 11, of L. Deckertii; 12, of L. divaricata; 13, of L. racemulosa; 14, of L. cernua; 15, of L. cubensis; 16, of L. Torreyi; 17, of L. Torreyi, var. congesta; 18, of L. maritima, var. typica; 19, of L. maritima, var. virginica; 20, of L. maritima, var. subcylindrica.

branches, erect or pendent, standing frequently at right angles to the axis, or as frequently reflexed to horizontally spreading: pedicels 1.5–2.5 mm. long, closely and minutely pilose: calyx about 2 mm. long, strongly pyriform, gradually broadening upward; the outer and inner sepals joined in an obconic base; the inner spatulate to elliptic-obovate and obtuse, densely and closely subappressed-pilose; the outer narrowly lanceolate, inconspicuous, much exceeded by the inner ones and joined with them high on the calyx: capsule dull, ellipsoid-obovoid, about 2 mm. long, equaling to slightly exceeding the calyx; the valves blunt, somewhat indurated, considerably coalesced, in maturity separating about to the middle: seeds 1–2, dark-brown, large (1.2 mm. or more long, 0.7–0.9 mm. broad), nearly equilateral to quite irregular, mostly with a considerably enlarged basal portion, the dorsal surface strongly convex and the ventral surface concave, with a membranaceous coat in maturity.—Bull. Torr. Bot. Cl. li. 384 (1924); Small, Man. 883 (1933).— Southern peninsular Florida, on sand-hills, sand-dunes and in scrub. I have seen the following specimens. Florida: scrub, near Sebastian, *Small, DeWinkeler & Mosier*, no. 11,164 (NY); scrub, on sand-hills, near Sebastian, *Small, Small & DeWinkeler*, no. 11,542 (NY); ancient sand-dunes, near Sebastian, September 6, 1922, *Small, Small & DeWinkeler* (type in Herb. N. Y. Bot. Gard.); scrub, near Sebastian, *Small & DeWinkeler*, no. 9832 (NY); sand-hills about Lake Jackson, *Small, Small & DeWinkeler*, no. 10,636 (NY); in a scrub, 13 miles south of Clearwater, August 21, 1929, *H. O'Neill* (US); scrub, between Avon Park and Sebring, *Small, Small & DeWinkeler*, no. 11,494 (NY); scrub, near Kuhlman, DeSoto Co., December 13, 1920, *Small & DeWinkeler* (NY); scrub-ridge, south of Frost Proof, DeSoto Co., *Small & DeWinkeler*, no. 9591 (NY); Manatee Co., *Chapman* (Mo); scrub, near Sarasota, *Small & Matthaus*, no. 11,630 (NY); Palm Beach, July, 1932, *W. Rhoades*, no. 2 (US). Plate 490, figs. 2, 3, and 4; map 14.

This, one of the most striking species of *Lechea*, had been quite overlooked until Small, recognizing some of its distinctive features, described it in 1924. Of its position in the genus he[1] then stated, "Technically it is related to *L. racemulosa*." Later, however, he[2] provided a special section, "*Cernuae*," to include it. With its broad leaves densely hairy both on the upper and on the lower surface, its shrubby habit and its peculiarly disposed fruits, having indurated capsules with valves considerably grown together, *L. cernua* is very greatly specialized. Only in the number of seeds per capsule (1 to 2) and in the great length of pedicels is it similar to *L. racemulosa;* and several other species share these characters. Without caring to make a major division for this or any other species except *L. san-sabeana*, I would,

[1] Bull. Torr. Bot. Cl. li. 384 (1924).
[2] Man. 883 (1933).

nevertheless, say that *L. cernua* is so distinct as to make obscure its relative position in the genus. In this respect it compares with *L. divaricata* and *L. san-sabeana*, both of which have modifications which, in a much less specialized condition, may be seen in but two or three other, and perhaps related, species.

12. L. CUBENSIS Leggett. Plant suffruticose, basal shoots unknown (probably lacking): fruiting stems several, low, 12–18 cm. tall, with sparsely pilose, spreading, slender branches disposed in irregular panicles and, to a considerable extent, persistent: cauline leaves narrowly linear to subulate, 3–5 mm. long, glabrous above, subappressed- to appressed-pilose beneath, caducous, thickly cloaking the branches before maturity: pedicels sparsely subappressed-pilose, 1.5–1.8 mm. long: fruiting calyx cuneate-obovoid, 1.8–2 mm. long, 1.2–1.4 mm. broad; interior sepals closely subappressed-pilose, obovate, obtuse, about 1 mm. broad, slightly exceeding the outer sepals: capsules about equaling the calyx; valves elliptic-oblong, 1.7–1.9 mm. long, 1–1.1 mm. broad: seeds 4–5, dark-brown, with dense endosperm, slightly curved, slender, slightly enlarged at the base, at least twice as long as broad, strongly convex dorsally, keeled ventrally and with one flat or concave side, the other convex or rounded.—Bull. Torr. Bot. Cl. vi. 252 (1878); Britton in Bull. Torr. Bot. Cl. xxi. 250 (1894); Grosser in Engler, Pflanzenr. iv[193]. 137 (1903).—Western Cuba, apparently very local. CUBA: sandy pine woods, La Grifa, January, 1865, *C. Wright*, no. 3518 (TYPE in Herb. N. Y. Bot. Gard.); Laguna Larga, near La Grifa, Pinar del Rio, *Ekman*, no. 18,164 (NY). PLATE 490, FIG. 5; MAP 15.

I have seen but two collections of this species both of which are somewhat fragmentary. Apparently the plant is characteristically very low and much branched. The calyces, capsules and seeds are most like those of *Lechea Torreyi* of the Florida Peninsula, the habit most like that of *L. Torreyi* var. *congesta* of broader distribution. Britton[1] says, after his description of *L. cubensis*, "this interesting species, known to me only from one collection, is placed next to *L. tenuifolia*, but the material for examination is too meagre to afford a satisfactory diagnosis." The most striking resemblance of the two is in the exterior sepals. In both these are long. In other respects, as of the fruit mentioned above, *L. cubensis* is much closer to *L. Torreyi*. The indication seems to be that most Lecheas at first had long exterior sepals and later these became reduced in many species. In the retention of fairly long exterior sepals *L. cubensis* is a primitive species of the *L. Torreyi* group. *L. tenuifolia* and its relatives have globose to

[1] Bull. Torr. Bot. Cl. xxi. 250 (1894).

broadly ovoid calyces broadest near the base. *L. cubensis*, on the contrary, has a cuneate-obovoid calyx serving to place it in quite another group of the genus, with *L. Torreyi* and its allied species.

13. L. Torreyi Leggett. Caudex mostly simple, the new shoots appearing from near the base of the plant, or extensively branched, with the new shoots from above: basal shoots in late fall or winter, resting or immediately developing, suberect, slender, simple to slightly branched, 6–10 or more cm. tall; the axis slightly spreading-pilose with short hairs: leaves dull, brownish-green, alternate, scattered, linear, acute, pilose beneath on midrib and margin, occasionally sparingly so elsewhere, glabrous above, 5–8 mm. long, 1 mm. wide or less: fruiting stems 1–several, 30–50 cm. high, branching mostly above the middle to form open or compact ovoid to subglobose panicles; the axis strongly pilose: cauline leaves dull, brownish-green, narrowly linear-elliptic, pointed, conspicuously pilose beneath mainly on midrib and margin, glabrous above, 1–2 cm. long, 1–1.5 mm. wide; rameal leaves similar but smaller, crowded, spreading: branches open and spreading-ascending to somewhat crowded and strongly ascending: ultimate fruiting branches strongly pilose, mostly straight; fruits racemose, scattered to subapproximate, maturing in early autumn: pedicels (0.5) 0.8–1.5 mm. long, densely pilose: fruiting calyx subglobose to obovoid, broadest above the middle, dark-brown to slightly ferruginous, densely pilose with short, soft, appressed to somewhat spreading cinereous hairs, about 2 mm. long, 1.6–1.8 mm. broad, exceeding and nearly or quite enclosing the capsule; inner sepals obovate-elliptic, obtuse; outer sepals about two-thirds as long as the inner: capsule ovoid, 1.5–1.7 mm. long, 1.4–1.5 mm. broad; valves firm, not greatly indurated: seeds 4–6, subequilateral and dorsiventrally compressed to inequilaterally 3-sided with one convex and one concave lateral face, 0.9–1 mm. long, less than half as broad.—Leggett ex Britton in Bull. Torr. Bot. Cl. xxi. 251 (1894), in part; Robinson in Gray, Syn. Fl. N. Am. i[1]. 194 (1895), in part; Grosser in Engler, Pflanzenr. iv[193]. 138 (1903), in part; Small, Fl. Se. U. S. 799 (1903), in part; Small, Man. 883 (1933), in part. *L. cinerea* sensu Leggett in Bull. Torr. Bot. Cl. vi. 247 (1878), in part; not Rafinesque. *L. cinerea* var. *Torreyi* Chapman, Fl. So. U. S. ed. 2, Suppl. 678 (1892) and ed. 3: 37 (1897).—Damp barrens and dry sandy ground, Florida, on the Atlantic and Gulf Coasts and inland. The following specimens are typical. Florida: Jacksonville, December 10, 1873, *Keeler*, in part (NY); rather moist ground, Mayport, October, 1873, *Keeler* (NY); St. Augustine or thereabouts, March, 1872, *J. Torrey* (type in Herb. N. Y. Bot. Gard.); road to Huckleberry Creek, Apalachicola, September 28, 1889, *Chapman* (Mo); camp, pine-barrens, just south of Poorhouse Landing, Apalachicola, September 20, 1889, *Chapman* (Mo); Okeechobee Prairie, Fort Bassinger to Okeechobee City, December 13, 1920, *Small & DeWinkeler* (NY); *Biltmore Herb.*, no. 4131; Mana-

tee, *Simpson, Chapman,* no. 414 (Mo); Braidentown, *Tracy,* no. 7579 (Field). PLATE 490, FIG. 6; MAP 16.

Var. **congesta,** nom. nov. Caudex simple or branching: fruiting stems often perennial, 20–40 cm. high: basal resting shoots lacking; new shoots from base of plant or from above on the perennial stems, developing without rest: plant dull-brownish-green, more densely pilose than the typical form of the species: panicles very compact, the branches crowded, strongly ascending to suberect: fruits very abundant, crowded, irregularly racemose to clustered on crooked short branches which are often sharply bent at each pedicel: calyx-lobes in maturity strongly ferruginous, giving a reddish cast to the plant in fruit; outer sepals scarcely two-thirds as long as the inner: seeds 3, equilateral, dorsiventrally compressed, elliptic-oblong, acute.—*L. cinerea* sensu Leggett in Bull. Torr. Bot. Cl. vi. 278 (1878), in part; Chapman, Fl. So. U. S. ed. 2, Suppl. 678 (1892) and ed. 3: 37 (1897); not Raf. *L. Torreyi* Leggett ex Britton in Bull. Torr. Bot. Cl. xxi. 251 (1894), in part; Robinson in Gray, Syn. Fl. N. Am. i[1]. 194 (1895); Grosser in Engler, Pflanzenr. iv[193]. 138 (1903); Small, Fl. Se. U. S. 799 (1903); Small, Man. 883 (1933).—Dry sandy areas and pine-barrens, southern North Carolina, west to southern Mississippi, south to southern Florida and British Honduras. The following are typical. NORTH CAROLINA: dry sand, west of Southport, January 30, 1922, *E. B. Bartram* (Phila). SOUTH CAROLINA: Bluffton, October 21, 1876, *Mellichamp;* Bluffton, September, 1875, *Mellichamp* (NY); Beaufort District, 1882, *Mellichamp* (US). GEORGIA: base of sand-hills of Seventeen Mile Creek, Coffee Co., R. M. Harper, no. 1436. FLORIDA: dry pine-barrens near Jacksonville, *Curtiss,* no. 5025; Jacksonville, December, 1873, *Keeler,* in part (NY); near Jacksonville, *Curtiss,* no. 4308 (Mo); dry pine-barrens, Duval Co., *Curtiss,* no. 232* (TYPE in Herb. N. Y. Bot. Gard.); Lake City, June–July, 1898, *A. S. Hitchcock* (Field); St. Augustine, May 1, 1879, *M. C. Reynolds;* St. Augustine, 1874, *Keeler;* New River, December 26, 1895, *A. S. Hitchcock* (Field); Sanford, September, 1902, *S. Rapp,* no. 3 (US); Eustis, Lake Co., *Nash,* no. 1096; Indian River, East Florida, 1874, *E. Palmer;* Manatee, *Simpson* (Mo); Tampa, August 25, 1903, *Britton & Wilson* (NY); Flatwoods, Myers, July and August, 1900, *A. S. Hitchcock,* no. 4; vicinity of Fort Myers, Lee Co., *J. P. Standley,* no. 318; Humbugus Prairie, Dade Co., *Small, Mosier & Small,* no. 6873 (NY). ALABAMA: sandy copses, near Dog River, Mobile Co., July 14, 1893, *Mohr* (US). MISSISSIPPI: Horn Island, July 14, 1899, *Tracy* (NY). BRITISH HONDURAS: dry pine-ridge, near Manatee Lagoon, *M. E. Peck,* no. 143. PLATE 490, FIG. 7; MAP 17.

There are several marked differences between *Lechea Torreyi* and the variety *congesta* which enable one immediately to set them apart. Whereas they both are strongly pilose almost all over and both are brownish-green, the former is loosely spreading-branched, with some-

what scattered fruits, the latter compactly ascending-branched, with crowded, even clustered, fruits. The inner sepals of *L. Torreyi* are dark-brown, occasionally ferruginous, but strikingly setting off the ashy (cinereous) pilosity which, apparently, chiefly caused Chapman to use the name "*cinerea*" of Rafinesque. *L. Torreyi* var. *congesta* has its inner sepals in maturity usually markedly ferruginous, so strikingly so, in fact, as to make obscure any peculiarity in color of their pubescence. A further difference lies in the number of seeds, which is 4–6 in *L. Torreyi* and 3 in var. *congesta*.

Britton[1] states that the types are in the Columbia College Herbarium, now embodied in the collections of the New York Botanical Garden. Presumably these are the several sheets there marked *L. Torreyi*, nov. spec. These are of both *L. Torreyi* and the variety *congesta*. In recognition of the fact that the species was named for Dr. Torrey, I have selected a specimen of his collecting as the type, "St. Augustine or thereabouts, March, 1872, Dr. John Torrey" (in Herb. New York Bot. Gard.).

Leggett,[2] in discussing Rafinesque's monograph of the genus, says of the diagnosis of *L. cinerea* Raf. "This is a pretty correct description of what I have distributed to correspondents as *L. Torreyi*. However there may be two distinct forms in Florida, one 3 seeded, the other 6 seeded and the name *L. Torreyi* I have hopes may hold." Chapman[3] also used the name *cinerea*, applying it to the 3-seeded plants. In addition he described, for the first time, what he called var. *Torreyi*: "Leaves and branches spreading or recurved; capsule 6-seeded (L. Torreyi, Leggett, ined.—S. Florida)." Britton eliminated the name *cinerea* in connection with *L. Torreyi*. His *L. Torreyi*, however, included Chapman's species and variety. Inasmuch as Britton's description fails to differentiate adequately between the two and as *L. Torreyi* is not properly typified by him, it falls on me to select a type for it. This I have done, allowing Chapman's var. *Torreyi* to include the type of *L. Torreyi* Leggett ex Britton.

Lechea cinerea Rafinesque[4] is placed by that author with the group "*Menandra*," having seeds 1–3 and external calyx of 2 short sepals. It is described as "adpressed pubescent, cinereous fastigiate; lvs. scattered, narrow linear adpressed; racemes paniculate, pauciflore,

[1] Bull. Torr. Bot. Cl. xxi. 251 (1894).
[2] Bull. Torr. Bot. Cl. vi. 250 (1878).
[3] Fl. So. U. S. ed. 2, Suppl. 678 (1892).
[4] New Fl. N. Am. i. 95 or 96 (1836).

subnaked: fls. canescent outside, sepals lanceolate acute; capsules oblong, longer." Except for the "lanceolate acute" sepals and the "oblong, longer" capsules the description might fit *L. Torreyi*. These, however, are characters of *L. patula*. It may be that, as is apparently the case with so many of Rafinesque's descriptions, he was dealing here with more than one species. In any case confusion would always arise if the name were here applied. Certainly capsules subglobose, enclosed by the calyx, as is the case in *L. Torreyi*, can never be interpreted to read "capsules oblong, longer" than the calyx.

A. A. Heller[1] mentions two specimens, one from Virginia, "at Suffolk in company with *L. racemulosa*," and the other along the North Carolina boundary, "on the southern boundary of Virginia, near Margarettsville, N. C." Both of these specimens are presumably of the *L. Leggettii* group which may resemble in habit, at least, large and openly branched specimens of *L. Torreyi*. Under *L. Leggettii* var. *ramosissima* I have cited a specimen of Heller's, "near Margarettsville, Northampton Co., no. 1128," possibly the identical plant of which he speaks. *L. Torreyi*, to the best of my knowledge, fails to get farther north than southern North Carolina.

14. L. MARITIMA Leggett. Caudex simple to multicipital, with stout often nearly erect branches: basal shoots simple, numerous and crowded to few and scattered, 3–10 cm. long; axes stout, densely pilose to subtomentose: basal leaves thick, dull-green, numerous, crowded (overlapping), often obscurely verticillate, lanceolate to elliptic-lanceolate, 3–5 times as long as broad, glabrous above, sparsely to densely pilose over the entire lower surface: fruiting stems stout, few to numerous, erect to strongly inclined: panicle evenly subpyramidal to narrowly subcylindric or decidedly one-sided, 15–35 cm. high; branches starting from near the base to above the middle: cauline leaves whorled and caducous below the panicle, alternate, approximate and mostly persistent in the panicle, narrowly oblanceolate, abruptly acute, narrowed gradually to the base, 0.7–2.5 cm. long, 1.2–4 mm. broad, during development subglabrous to conspicuously scattered-pilose on the upper, scattered-pilose on the lower surface; in maturity mostly glabrous on the upper surface and scattered-pilose on the lower: rameal leaves shorter and proportionately narrower, often crowded: fruits mostly subappressed, on secondary or tertiary branches, crowded and clustered at the tips to distinctly racemose and not crowded: flowers in late summer: stamens variable in number (6–10 or more): pedicels 1 mm. or less to 2 mm. long: calyx pyriform to broadly ovoid, 1.6–2.1 mm. long, strongly subappressed-pilose: inner sepals slightly keeled, elliptic-ovate and subacute to elliptic and

[1] Bull. Torr. Bot. Cl. xxi. 23 (1894).

acute; outer sepals much shorter than to equaling the inner: capsule 1.3–2.1 mm. long, subglobose to broadly ovoid, shorter than to equaling the calyx: seeds 2–5 (–6), light-brown, not lustrous, the surface smooth, with the embryo faintly discernible through the semitransparent endosperm, slightly inequilateral; in shape and in number per capsule variable in the species as a whole, but with fairly constant characters in each of the varieties.

a. Panicles subcylindric to broadly subpyramidal, the branches mostly from below the middle: calyx mostly pyriform to cuneate-obovoid, 2 mm. or less in length; the outer sepals inconspicuous, considerably exceeded by the inner: seeds 2–4 (–5).
  Seeds 3–4 (–5), obscurely 3-sided or 2-sided and convex ventrally, 0.8–1.1 mm. (mostly 1 mm. or slightly less) in length, much less in width: panicle branching at about the middle, mostly uniformly so.....Var. *typica.*
  Seeds 2, dorsally convex, ventrally flattened to slightly concave, 1–1.2 mm. (mostly more than 1 mm.) long, 0.7–0.8 mm. broad: panicle branching mostly from near the base, often 1-sided and to a considerable extent persistent to the second year.....Var. *virginica.*

a. Panicle slenderly subcylindric, the branches mostly from above the middle: calyx slightly depressed-globose, 2 mm. or slightly more in length; the outer sepals conspicuous, at times nearly equaling the inner: seeds 4–5 (–6).
Var. *subcylindrica.*

Var. **typica.** Caudex simple, unbranched and but slightly enlarged (particularly inland), or greatly thickened and multicipital (when partially or completely buried in sand), with stout, woody subprocumbent to nearly erect branches (along the Atlantic Coast in sandy areas): basal shoots procumbent to suberect, 3–10 cm. long; their leaves obscurely whorled, overlapping and crowded toward the end of the shoot, 5–10 mm. long, from one-third to one-quarter as broad, largest toward the tip of the shoot (at its base very small early leaves frequently persisting), lanceolate and acute, rounded at the base, uniformly sparsely to densely subappressed-pilose over the entire lower surface, glabrous above: fruiting stems 15–35 cm. high, branching from below the middle, forming either a dense pyramidal panicle with the lower branches long and broadly spreading and with the uppermost branches very short or a subcylindric open panicle with the lower branches not greatly exceeding the upper: cauline leaves somewhat scattered-pilose above in development: fruits of the dense panicles mostly in clusters on short secondary branches, of the open cylindrical panicles scattered along the secondary and the upper primary branches: pedicels 1 mm. or less to 1.5 mm. long: calyx pyriform to subglobose, 1.8–2 mm. long, strongly pilose; interior sepals elliptic to elliptic-ovate, acute, slightly keeled; exterior sepals narrowly lance-linear, much shorter: capsule broadly ovoid to globose, 1.3–1.8 mm. long, nearly as broad, hardly equaling the calyx; valves ovate, spreading slightly at maturity: seeds mostly 3 (rarely 2 or 5),

0.8–1.1 mm. long, 2-sided and dorsally rounded, ventrally convex or 3-sided and with 2 quite unequal and somewhat obscure lateral faces, the base enlarged, the apex subacute.—*L. maritima* Leggett in Britton, Prel. Cat. Pl. N. J. 13 (1881); Britton in Bull. Torr. Bot. Cl. xxi. 249 (1894); Robinson in Gray, Syn. Fl. N. Am. i[1]. 192 (1895); Britton in Britton & Brown, Ill. Fl. ii. 443, fig. 2478 (1897); Britton, Man. 632 (1901); Grosser in Engler, Pflanzenr. iv[193]. 138 (1903); Small, Fl. 799 (1903); Robinson & Fernald in Gray, Man. ed. 7: 578 (1908); Stone, Pl. So. N. J. ii. 563, pl. 83, fig. 4 (1911); N. Taylor, Fl. Vic. N. Y. 449 (1915); Small, Man. 883 (1933). *L. thymifolia* sensu Pursh, Fl. Am. Sept. i. 91 (1814); Torrey, Fl. N. & Mid. St. 161 (1824); Eaton, Man. ed. 3: 328 (1822); Eaton & Wright, N. Am. Bot. 294 (1830); Beck, Bot. No. U. S. ed. 1: 36 (1833); Torrey & Gray, Fl. N. Am. i. 153 (1838); Wood, Class Bk. Bot. 57 (1845); Torrey, Fl. N. Y. i. 79 (1843); Gray, Gen. Ill. i. 206, t. 88 (1848) and Man. ed. 5: 81 (1867); Leggett in Bull. Torr. Bot. Cl. vi. 251 (1878); not Michx. *L. minor* var. *maritima* Gray in Watson & Coulter in Gray, Man. ed. 6: 77 (1890). *L. maritima* var. *interior* Robinson in Rhodora, x. 34 (1908). —Sandy soil near the sea, and inland, particularly in river valleys, southern Maine and north-central New Hampshire (Crawford Notch) to Delaware, in Massachusetts and southern New Hampshire abundant, generally, on dry slopes. The varieties of *L. maritima* are geographically segregated and have well defined characters making it unnecessary to record representative material of var. *typica*. Plate 490, fig. 8; map 18.

Var. **virginica**, var. nov. Caudex crassus multicipitalis ramis saepe ad 1 dm. longis subprocumbentibus apice adscendentibus; rami basilares pauci sparse dispositi; folia basilaria saepe persistentia 4–5- plo longiora quam lata; caules fructiferi erecti vel suberecti; panicula subaequilateralis vel caule declinato inaequilateralis ramis suberectis; rami sub medio plerumque longissimi (ad 30 cm. longis) supra medium gradatim breviores; calyx late ellipsoideus vel subglobosus 1.9–2.1 mm. longus; capsula late ellipsoidea vel depresso-globosa 1.5–1.9 mm. longa 1.5–1.7 mm. lata; semina plerumque 2 dorso convexa ventre plana vel concava subaequilateralia 1–1.2 mm. longa 0.7–0.8 mm. lata.—Sandy areas near the coast in southeastern Virginia. I have seen the following specimens. Virginia: sand dunes, Savage Neck, Northampton Co., *Fernald & Long*, no. 5377; Fortress Monroe, May 12, 1877, *L. F. Ward* (US); outer dunes, vicinity of Cape Henry, *E. P. Killip*, no. 6660 (NY); sand dunes, Cape Henry, *Fernald & Griscom*, no. 2856; open sands and dunes, Cape Henry, *Fernald & Long*, no. 4948; Virginia Beach, September 26 & 27, 1890, *Hollick & Britton* (type in Herb. N. Y. Bot. Gard.); near Virginia Beach, *T. H. Kearney, Jr.*, nos. 1387, 2094 (US); near Ocean View, Norfolk Co., *T. H. Kearney, Jr.*, no. 1001 (US). Plate 490, fig. 9; Map 19.

Var. **subcylindrica**, var. nov. Caudex simplex vel multicipitalis ramis paucis brevibus; rami basilares eis varietatis typicae similis,

folia basilaria dorso plus minusve pilosa; folia caulina supra plerumque glabra dorso subadpresse pilosa praecipue in costa et in margine; caules fructiferi pauci erecti 20–35 cm. alti; panicula anguste subcylindrica; rami supra medium breves (1–4 cm. longi); fructus aggregati vel in racemum dispositi; pedicelli 1.5–2 mm. longi; calyx pedicellos aequans vel superans ovoideus vel globosus; sepala interiora obscure carinata ovato-elliptica subacuta; sepala exteriora anguste lanceolata vel linearia interiora plus quam ¾ vel fere aequantia; capsula late ovoidea vel globosa 1.8–2.1 mm. longa calycem subaequantia; semina 3 5 (6) plerumque 4–5 dorso valde convexa ventre convexa vel carinata et aequilateralia 1–1.1 mm. longa.—Sandy coast of eastern New Brunswick and the islands of Miramichi Bay. I have seen the following specimens. New Brunswick: Fox Island, Miramichi, July 13, 1892, *J. Fowler* (US); South Beach, on grass (*Ammophila*)-plain, Richibucto, Kent Co., *S. F. Blake*, no. 5709; grass-plain, Kouchibouguac, Kent Co., *S. F. Blake*, no. 5727; sur les dunes, Buctouche, comté de Kent, *Victorin, Rolland-Germain & Jacques*, no. 44,651; grass (*Ammophila*)-plain, Portage Island, Northumberland Co., *S. F. Blake*, no. 5672 (type in Gray Herb.); grass (*Ammophila*)-plain, Fox Island, Northumberland Co., *S. F. Blake*, no. 5690. Map 20.

The type specimen of Pursh's *Lechea thymifolia*, which is in the Kew Herbarium, is of our *L. maritima* according to Britton[1] who, presumably, had seen the specimen since he wrote "This paper is, then, essentially based on the examination of type specimens."

Lechea maritima grows abundantly in almost pure sand along the coast and hence may usually be quickly identified. Often, however, it occurs inland in company with *L. villosa*, *L. Leggettii* or any other species whose range it overlaps and then there is, quite often, difficulty in identifying it. From *L. Leggettii* and *L. intermedia* it may be distinguished by its basal leaves, which are pilose all over beneath (not merely on midribs and margins as in those species) and by its seeds. These are inequilateral, smooth, light-colored, usually 3 in number and dorsiventrally thickened but not strongly angled, characters which effectively separate *L. Leggettii*, with its prevailingly dark-brown, equilateral and dorsiventrally compressed seeds, and *L. intermedia*, with its predominantly 5–6 seeds which are markedly keeled and have a conspicuously reticulate surface in maturity.

Lechea maritima has the type of variation mentioned in *L. tenuifolia*, giving rise to large-seeded and small-seeded phases unaccompanied by other important morphological differences and with no differences in geographical range nor even in habitat. However,

[1] Bull. Torr. Bot. Cl. xxi. 245 (1894).

types of ecological variations do occur which are not at all uniform. They embody slight changes in quantity of hairiness, quality of branching, color, etc. in inland plants which cause them to appear quite distinct from the usual maritime extreme. Dr. Robinson[1] described *L. maritima* var. *interior*, incorporating in it most of the inland smooth specimens of the species. He cited, as a type, his collection, "dry soil, Troy, N. H., no. 588." That a lessening in degree of pilosity is a result of growing inland is attested by the fact that in interior parts of Connecticut, Massachusetts and New Hampshire are plants differing in other vegetative characters from the Troy specimen, but alike in regard to degree of pilosity. It is safe to say, I feel, that inland forms in this particular character have become altered quite independently of other forms, and that the plants at Crowford Notch, for example, and in northern Connecticut, are more related to those of York County, Maine and to those of southern Connecticut, respectively, than to each other. In regard to degree of pubescence there is a tremendous range of variation among the plants growing near the sea thus eliminating the degree of pubescence, I believe, as an important character within the species. The variety *interior* covers, in my opinion, a number of unclassifiable forms.

Many of the specimens from Connecticut which have been placed in var. *interior* are probably hybrids between *L. maritima* and *L. Leggettii* var. *typica*. These are intermediate in most respects between the two parents; but, because of the fairly close resemblance in habit between the two, they are usually difficult to separate. Presumable hybrids between *L. maritima* and *L. villosa* are fairly common (see discussion of hybridity in introduction).

The variety *virginica* is best developed in Princess Anne and Norfolk Counties in southeastern Virginia. Many of the specimens are decidedly irregular in growth, having a strongly one-sided branching. This may be because the branches are usually perennial and often somewhat suffruticose. The persistent caudices send up shoots from any part, as do those of typical *Lechea maritima*, but the caudices themselves are more extensive and are suberect to procumbent. What appears, then, like an annual inclined stem with numerous branches, is a woody perennial axis from which the annual stems arise on the upper side. In itself this form of growth would not serve to separate a variety of *Lechea*. The same thing happens in *L. villosa*

[1] Rhodora, x. 34 (1908).

with, I believe, no varietal differences appearing. However, *L. maritima* var. *virginica* regularly produces two large seeds in a capsule as contrasted with the usual three of var. *typica*. Also, the resting shoots have narrower and more persistent leaves than in the var. *typica* and when developed the leaves are more pilose on the upper surface. The presence or lack of pubescence on the upper surfaces seems to be correlated with certain stages of development of the shoots of several species of *Lechea*. It is fairly conspicuous in var. *virginica* and has been noted and discussed by Kearney.[1] Briefly, he states that the leaves, when orthotropic, become isolateral. The leaves, usually hairy only above, become hairy on both surfaces when growing erect. It seems to me that the occurrence of this feature is too constant a factor in those species which show it to be explained completely in such a way. There is a strong inheritance-factor here as well and, like so many characters which seem to be direct responses to the environment, they act at times despite their environments.

In northeastern New Brunswick is an equally well marked variety of *Lechea maritima*, which I have named var. *subcylindrica* because of its very slender panicles. So close in superficial resemblance to *L. intermedia* is it that every sheet which I have seen has at some time been misidentified as that species by collectors and even by students of the genus. The basal leaves and seeds are generally characteristic of *L. maritima*. However, its narrowly subcylindric panicle of large fruits and its lanceolate to linear exterior sepals, which at times may nearly equal the interior sepals in length, serve to separate it as a well marked geographic variety. The *L. maritima* growing in southern Maine and central New Hampshire, as far north as Crawford Notch, simulates, in some respects, the New Brunswick plant, except that in New England no strong differences have developed, but only tendencies which reveal themselves in a great variability of certain characters.

At Bathurst, New Brunswick, forty miles to the north of the range of *Lechea maritima* var. *subcylindrica* is found *Aster subulatus* var. *obtusifolius* Fernald. Except for this station, *Aster subulatus* reaches its northeastern limit in York Co., Maine. Its offshoot several hundred miles to the northeast demonstrates variation comparable to that shown in this variety of *Lechea maritima*. Fernald & Griscom[2] further subdivide *Aster subulatus*, describing var. *euroauster*, giving

[1] Bot. Surv. Dismal Swamp Region in Contrib. U. S. Nat. Herb. v. 389, 390 (1901).
[2] Rhodora, xxxvii. 183 (1935).

the range as "eastern Massachusetts to Florida, . . . chiefly southern." The type is from that part of Virginia where *Lechea maritima* var. *virginica* is abundant. *L. maritima*, therefore, has a distribution in part, at least, quite like that of *Aster subulatus*.

Lechea maritima has generally been considered to have a more extensive range than it actually has. Small[1] gives the range as "Massachusetts to Virginia and Georgia"; and quite recently, of its range he[2] says "Coastal Plain and New England Coast, Ga. to Me." I have seen no specimens from south of Virginia on the Atlantic Coast and none inland about the Great Lakes, although Coulter[3] and Pepoon,[4] following Hill, list the species as to be found in the Chicago area near the southern end of Lake Michigan. Peattie[5] says of the species "Rare, at Miller." The very close similarity to *L. maritima* of immature plants of *L. patula* and *L. Torreyi* in the southern United States and of *L. stricta* in the Lake Michigan region undoubtedly accounts for these doubtful records.

The fact that the range of *L. maritima* is quite restricted is of considerable interest because, on the one hand, the species is strikingly successful in competition with other plants (even appearing weedy at times) and, secondly, it is one of the more distinct of our northeastern species.

15. L. STRICTA Leggett. Caudex simple; basal shoots in mid- and late autumn, numerous, short, simple, slightly crooked, subprocumbent, 2–3 cm. long; the axis strongly subappressed- to spreading-pilose or slightly villous: basal leaves obscurely verticillate or scattered, crowded, lanceolate to lance-elliptic, attenuate to base, 0.7–1.2 mm. broad, 3–5 mm. long, glabrous above, subappressed-pilose beneath on midrib and margin: fruiting stems one to several, 25–45 cm. tall; branches above the middle, strongly ascending to suberect: panicle spire-shaped to slenderly pyramidal; the axis of young stems and immature branches tomentose, in maturity becoming densely subappressed-pilose: cauline leaves abundant, subappressed, often persisting well below the panicle, narrowly oblanceolate, attenuate to the base, abruptly pointed or acute at the apex, 1.3–2 cm. long, 1.5–3 mm. broad, glabrous above, strongly subappressed- to spreading-pilose with short flexuous hairs on midrib and margin of the lower surface, frequently sparsely pilose elsewhere beneath; rameal leaves much smaller, numerous: fruits mostly crowded-racemose: pedicels strongly

[1] Fl. Se. U. S. 799 (1903).
[2] Man. 883 (1933).
[3] Fl. Pl. & Ferns of Ind. 841 (1899).
[4] Fl. Chicago Area, 390 (1927).
[5] Fl. of Ind. Dunes, 266 (1930).

pilose, equaling to exceeding the calyx: buds tomentose: calyx in fruit subglobose, equalling to exceeding the capsule, strongly pilose with somewhat spreading pubescence; outer sepals linear, not more than two-thirds as long as the inner; inner sepals ovate to obovate, obtuse, 1.6–1.8 mm. long, 1.2–1.3 mm. broad: capsule subglobose to broadly ovoid: seeds 3–4, narrowly ovate and equilateral, dorsiventrally compressed and ventrally convex or keeled and somewhat inequilateral.—Leggett ex Britton in Bull. Torr. Bot. Cl. xxi. 251 (1894); Robinson in Gray, Syn Fl. N. Am. i^{1}. 193 (1895); Britton in Britton & Brown, Ill. Fl. ii. 444, fig. 2483 (1897); Britton, Man. 633 (1901); Grosser in Engler, Pflanzenr. iv^{193}. 138 (1903); Robinson & Fernald in Gray, Man. ed. 7: 578 (1908). *L. minor* f. *stricta* Gray in Robinson in Gray, Syn. Fl. N. Am. i^{1}. 193 (1895).—Sandy fields and woods or lake-shores and prairies, Ontario and Indiana to Minnesota and Nebraska. Ontario: sandy soil, Belleville, July, 1877, *J. M. Macoun;* vicinity of Belleville, August 3, 1876, *J. Macoun.* Indiana: sandy field, North Judson, August 29, 1894, *E. J. Hill* (Field); sandy ground, Clark, September 10, 1881, *Hill* (Field); Lake Co., *Hill* (Field). Wisconsin: Scott, Brown Co., August 6, 1899, *Schuette* (Field); Cross Plains, Dane Co., September 14, 1916, *J. R. Heddle* (Field); Dells of the Wisconsin, August, 1858, *Lapham* (NY); dry sandy slopes, near Mauston, Juneau Co., *E. J. Palmer,* no. 28,439; Camp Douglas, Juneau Co., August 13, 1891, *E. A. Mearns;* sand plain between Fountain City Slough and Waumandee Lake, Fountain City, *Fassett,* no. 3416. Illinois: beach-region, north of Waukegan and east of the glacial Glenwood Ridge, Lake Co., August 14, 1908, *F. C. Gates* (Field); edge of thicket, Evanston, August 4, 1911, *E. E. Sherff;* sandy border of woods, Cook Co., August 27, 1896, *A. Chase;* Englewood, October 27, 1881, *E. J. Hill;* northern part, October 24, 1874, *Bebb,* marked *L. stricta* provisionally nov. spec. (type in Herb. N. Y. Bot. Gard.); knolls in oak-openings, Fountaindale, Winnebago Co., 1873 & 1879, *Bebb; Bebb,* no. 2087 (with a letter of N. L. Britton to Bebb); sandstone region, Rock River, end of August 1874, *Bebb* (NY); dry barrens, near Byron, Fountaindale, Winnebago Co., 1877, *Bebb* (Field); Shirland, June 26, 1908, *Gleason;* Byron, Ogle Co., *Bebb* (Field); Oquawka, *Patterson* (Field); Oregon, September 1, 1888, *M. B. Waite.* Minnesota: Winona Co., July–October, 1897, *Holzinger* (NY); Leaf Mountain, July, 1897, *J. E. Campbell;* Lindstrom, Chisago Co., August, 1892, *B. L. Taylor* (Field); Zumbrota, Goodhue Co., August, 1892, *Ballard* (US); sandy soil, Hennepin Co., September, 1892, *Sandberg* (Field); Brainerd, August 8, 1903, *C. D. Mell* (NY); Morrison Lake, Clearwater Co., September 6, 1929, *M. L. Grant* (US); Muskoda, Red River Valley, August 12, 1901, *Ballard,* no. 3112. Iowa: Manchester, September, 1897, *C. E. Bull;* along Cedar River, Muscatine Co., September, 1892, *F. Reppert* (NY); prairies, Fayette, August, 1894, *Fink;* Jasper Co., *J. W. Preston;* Ames, November 8, 1877, *R. Burgess* (Field). Nebraska: Long Pine, August 16, 1899, *J. M. Bates.* Map 21.

This species has been difficult to separate from its near relatives, *Lechea intermedia* and *L. Leggettii*. The extremes of variation in one or more characters of *L. stricta* may grade into either of the other two species. In addition, apparent hybrids occur with these or with *L. tenuifolia*. The consequence is that the species has been the most puzzling one of the entire genus to separate and clearly to diagnose. The fruits generally resemble those of *L. Leggettii* var. *typica*, although the calyx is densely and quite prominently spreading-pilose to subvillous and the seeds are often 4 in number and quite prominently keeled, approaching in shape, not in color or markings, those of *L. intermedia*. In shape the basal leaves are quite like those of *L. intermedia* and its varieties but are conspicuously spreading-pilose to subvillous on midrib and margin. The outstanding characteristics of *L. stricta* are the strongly appressed-ascending character of the leaves and branches and the very strong pilosity of the primary stems, branches and lower surfaces of the cauline leaves. With both of these characters there is sufficient variability for confusion to occur.

The species illustrates in general the kind of specific differentiation which takes place in *Lechea*. It differs trivially from its nearest relatives in almost all the points used to separate the species in the genus. The characters of seeds, capsules, sepals, branching, general pubescence and cauline and basal leaves together form a combination that no other species can duplicate. No characters by themselves are strongly accented in any way; neither are they definitely intermediate between those of any two other species. They represent merely a progressive tendency of the whole plant to vary in a combination of characters. Similar but less striking differences are exemplified in the cases of geographic varieties of other species which, in some instances, show more striking single departures from their closest relatives than does *L. stricta* from its related species.

Lechea stricta has the center of its distribution in and about the Driftless Area in northern Illinois, northeastern Iowa, southeastern Minnesota and in southern Wisconsin. Outlying stations occur in northern Nebraska and in northwestern Minnesota in valleys of rivers tributary to the Mississippi, and in southern Ontario. The above range can be explained fairly simply by assuming the species to have survived at least the Wisconsin stage of the Pleistocene Glaciation in the Driftless Area,[1] along with such plants as *Lespedeza*

[1] Fernald, *Persistence of Pl. in Unglac. Areas of Bor. Am.* in Mem. Amer. Acad. xv. 317, 318 (1925).

leptostachya Engelm., *Talinum rugospermum* Holzinger and *Asclepias Meadii* Torrey, and to have radiated therefrom in Post-Pleistocene time. The abundance of the plant in the area about the southern end of Lake Michigan may be correlated in a general way with the presence there of numerous species and varieties of plants found elsewhere only on the Atlantic Coastal Plain or it may be the result of migration from the Driftless Area. The station in Belleville, Ontario is impossible of explanation unless we assume that the last stage of Pleistocene Glaciation represented a much less extensive but perhaps more complicated series of events than has previously been held by many geologists.

16. L. Leggettii Britton & Hollick. Caudex mostly simple: basal shoots 3–8 cm. long, slender, procumbent to suberect; the axis subappressed-pilose with gray hairs: basal leaves verticillate to subverticillate or scattered, not at all to slightly overlapping, subappressed at base to the axis, narrowly lanceolate or oblanceolate to narrowly lance-elliptic, narrowed gradually to both apex and base, acute or pointed at apex, 4–10 mm. long, 0.8–2.5 mm. broad, glabrous above, sparsely pilose beneath on midrib and margin with appressed to somewhat spreading hairs: fruiting stems frequently one, rarely many, 25–80 cm. tall: branches mostly above the middle, few to numerous, widely spreading to ascending; panicle openly to densely subcylindric to subglobose; axes of stem and branches sparsely subappressed-pilose to glabrate: cauline leaves narrowly oblanceolate to linear, attenuately narrowed at the base to the slender (1 mm. long) petiole, 1–2 cm. long, 1.5–3 mm. broad: fruits in late summer and early autumn, scatteringly racemose, long-pedicelled and secund to short-pedicelled and clustered: pedicels slender, 1.2–2.3 mm. long, shorter than to equaling or exceeding the calyx, conspicuously subappressed-pilose: calyx subglobose to slenderly pyriform, 1.6–2 mm. long, 1.3–2 mm. broad; inner sepals prominently 3-veined, not keeled, shallowly concave, broadly ovate or obovate to narrowly obovate, obtuse, conspicuously to densely subappressed- or slightly spreading-pilose; outer sepals inconspicuous, narrowly lanceolate, about two-thirds as long as the inner: capsule subglobose to ellipsoid, 1.5–2 mm. long, 1.3–1.6 mm. broad: seeds 2–3 (4), 1–1.25 mm. long, 0.5–0.7 mm. broad, medium- to dark-brown, with the embryo distinct but not conspicuous, dorsiventrally compressed and narrowly ovate, with the base enlarged and the apex subacute or dorsiventrally thickened, keeled, obscurely 3-sided and somewhat inequilateral.

a. Panicle slenderly ovoid to subcylindric; the principal branches subequal, the ultimate branches greatly reduced, bearing crowded, frequently clustered fruits: calyx in fruit light- to dark-brown, cuneate-obovoid: seeds 3–4, 1–1.1 mm. long, frequently thickened dorsiventrally and keeled . . . . . Var. *typica.*

a. Panicle subcylindric to subglobose; the branches diminishing upward, the ultimate branches several cm. in length, bearing racemes of scattered fruits: calyx in fruit brownish- to reddish-purple, pyriform, narrow to broad above: seeds 2–3, 1.1–1.25 mm. long, compressed dorsiventrally or 3-sided.

Fruiting stems up to 80 cm. high: panicles well above the middle, broadly and irregularly ovoid to globose: seeds mostly 2, dorsiventrally compressed and equilateral. Var. *ramosissima.*

Fruiting stems up to 60 cm. high: panicles at about the middle, subcylindric to slender-ellipsoid: calyx slenderly pyriform: seeds mostly 3, frequently inequilateral and 3-sided or dorsiventrally compressed..... Var. *moniliformis.*

Var. **typica.** Basal leaves narrowly elliptic or oblanceolate, broadest at or about the middle, 4–8 mm. long, 0.8–1.6 mm. broad: fruiting stems 25–55 cm. high: panicle slenderly ellipsoid to subcylindric; branches at or about the middle, open to crowded, subequal, spreading, 3–8 cm. long: fruits crowded-racemose to clustered at the tips of the short ultimate branches; pedicels shorter than calyx: calyx cuneate-obovoid, 1.6–1.8 mm. long, 1.4–1.7 mm. broad, strongly pilose with fine, subappressed, gray, short hairs; interior sepals ovate to obovate, obtuse: capsule subglobose, 1.5–1.6 mm. long, hidden by the calyx: seeds 3–4, mostly 3, 1–1.1 mm. long, 0.5–0.6 mm. broad, dorsiventrally compressed and narrowly ovate or elliptic to dorsiventrally thickened and somewhat obscurely and unequally 3-sided.—*L. Leggettii* Britton & Hollick in Britton in Bull. Torr. Bot. Cl. xxi. 251 (1894); Robinson in Gray, Syn. Fl. N. Am. i[1]. 193 (1895); Britton in Britton & Brown, Ill. Fl. ii. 443, fig. 2480 (1897); Britton, Man. ed. 1: 633 (1901); Grosser in Engler, Pflanzenr. iv[193]. 138 (1903); Small, Fl. 799 (1903); Robinson & Fernald in Gray, Man. ed. 7: 579 (1908); Stone, Pl. So. N. J. ii. 562, pl. 83, fig. 5 (1911); N. Taylor, Fl. Vic. N. Y. City, 44 (1915); Small, Man. 883 (1933). *L. minor* sensu Pursh, Fl. Am. Sept. i. 91 (1814), in part; and of many early Am. authors, probably, in part; not L.—Dry woods, sterile fields, pond-shores, etc., mostly inland, eastern Massachusetts to Virginia and Ohio. The several varieties of *L. Leggetti*, although distinct enough in the major parts of their ranges, intergrade rather more than do those of any other species of the genus. For this reason, and because in the southeastern states there is a fancied resemblance (as indicated by identifications from that area) of var. *ramosissima* to one or more other species, it seems wise to include citations of representative specimens of all. Massachusetts: border of Purgatory Swamp, Dedham, July 23, 1909, *Wiegand;* dry woods, Scituate, September 13, 1914, *C. H. Knowlton;* dry sandy clearing, Lakeville, *Fernald & Long*, no. 9961; New Bedford, September 21, 1910, *Hervey;* Nonquit, Bristol Co., August 3, 1904, *Hervey;* dry woods, Chilmark, Dukes Co., *J. A. Cushman*, no. 7530. Rhode Island: sandy soil, Bold Water Point, Providence, September 7, 1906, *J. F. Collins;* dry pond-shore, Rich-

mond, Washington Co., August 30, 1919, *Fernald & Collins;* dry woods north of Ashaway, Hopkinton, Washington Co., September 1, 1919, *Fernald, Woodward & Collins.* Connecticut: damp soil, Great Oak Farm, Ledyard, August 28, 1920, *Graves & Woodward;* Groton, New London Co., September 1, 1897, *Graves;* Hartford, 1900, *H. J. Koehler;* open roadsides, Cromwell, Middlesex Co., October 16, 1919, *C. F. Batchelder;* dry barren ground, Southington, September 25, 1897, *Bissell;* near Wintergreen Lake, New Haven, October 13, 1903, *Woodward;* Trumbull, Fairfield Co., August 4, 1892, *Averill.* New York: Eaton's Neck, Long Island, September, 1887, *T. Hogg* (NY); dry ground, Lakeville, Hempstead, Long Island, September 13, 1901, *J. R. Churchill;* Staten Island, November 10, 1872, *Leggett;* Court House, New Dorp, Staten Island, September 5, 1877, *Leggett* (NY); Princes' Bay, Staten Island, October 6, 1894, *T. H. Kearney*, Jr. (NY). New Jersey: Bergen Point, October 7, 1876, *Leggett* (type in Herb. N. Y. Bot. Gard.); Monmouth Co., September 10, 1876, *Leggett;* sandy wood, Red Bank, September 10, 1875, *Leggett;* Leedsville, September 10, 1876, *Leggett.* Pennsylvania: grassy scrubby sides of a road, near Slatington, Lehigh Co., *Pretz*, no. 13,156; Buckingham Mountain, Bucks Co., July 23, 1917, *C. D. Fretz;* sandy woods, north of Malvern, Chester Co., *E. B. Bartram*, no. 1202; Jerseytown, Columbia Co., July 25, 1889, *Heller;* New Red Sandstone, South Mountain, Penryn, Lebanon Co., *Heller*, no. 502; Smithville, Lancaster Co., October 18, 1890, *Small;* barrens of Huntington Co., August, 1876, *J. R. Lowrie* (Field). Delaware: thin soil, near Wilmington, September 15, 1899, *Canby;* dry soil, Stanton, September 16, 1897, *Commons;* Harrington, 1872, *Canby* (NY). Maryland: Emmetsburg, 1828–1834, *J. Hall* (Field). Virginia: dry sandy field, Clarendon, *S. F. Blake*, no. 10,864; dry soil, Gordonsville, September 1, 1890, *F. Blanchard* (Mo); region about Mount Crawford, Rockingham Co., 1200–1500 ft. alt., *Heller & Halbach.* Ohio: Newell Ledge, Portage Co., *R. J. Webb*, no. 815. Plate 491, fig. 1; map 22.

Var. **moniliformis** (Bicknell), comb. nov. Basal leaves lanceolate to lance-elliptic, 6–10 mm. long, 1.5–2.7 mm. broad: fruiting stems 25–60 cm. high: panicle slenderly and compactly cylindric-paniculate with short spreading branches to subglobose with openly spreading-ascending to erect branches; branches subequal to very unequal, 5–15 cm. long, often shorter toward the apex: fruits loosely racemose on long (several cm.) secondary or tertiary branches: pedicels 1.8–2.3 mm. long, nearly equaling to slightly exceeding the calyx: calyx reddish-purple, pyriform (often slenderly so), 1.7–2 mm. long, 1.2–1.4 mm. broad, conspicuously subappressed-pilose with rather long white hairs; interior sepals narrowly obovate, obtuse: capsule ovoid, 1.7–2 mm. long, 1.3–1.6 mm. broad, not completely concealed by and frequently slightly exceeding the calyx: seeds 2–4, mostly 3, 1.1–1.2 mm. long, 0.6–0.7 mm. broad, subequilateral, dorsiventrally compressed, broadest near the base, tapering above to the subacute or

narrowly obtuse apex, or 3-sided and quite inequilateral.—*L. moniliformis* Bicknell in Britton, Man. 632 (1901); Britton in Britton & Brown, Ill. Fl. ed. 2, ii. 544 (1913).—Open woods, margins of bogs, sandy areas, frequently in damp situations. On the Atlantic Coastal Plain from Nantucket Island to southern New Jersey; in Ohio and Ontario near Lake Erie and in Indiana near Lake Michigan. The following specimens are typical. MASSACHUSETTS: Chappaquidick Island, October 5, 1911, *E. P. Bicknell* (NY); Tom Never's Head, Nantucket, August 23, 1896, *F. S. Collins;* Squam, Nantucket Island, September 18, 1899, *Bicknell* (TYPE in Herb. N. Y. Bot. Gard.); head of Tom Never's Swamp, Nantucket Island, August 31, 1904, *Bicknell* (NY). NEW YORK: East Hampton, Long Island, *Ferguson*, no. 7316 (NY); Greenport, Long Island, *Ferguson*, no. 3393 (NY); Laurelton, Long Island, *Ferguson*, no. 4706 (NY); Hempstead, Long Island, September 9, 1919, *Ferguson* (NY); low grounds, Rosedale, Long Island, October 25, 1902, *Bicknell* (NY); borders of Oak Island, in salt meadows, Woodmere, Long Island, November 6, 1906, *Bicknell* (NY); Rockville Centre bog, August 22, 1903, *Bicknell* (NY). NEW JERSEY: Closter, *C. F. Austin;* Spring Lake, July, 1834, *Lighthipe* (NY); Avon, Monmouth Co., October, 1922, *Mackenzie* (NY); dry clearings, Somers Point, *Mackenzie*, no. 7391 (NY); vicinity of Batsto, *Standley & Killip*, no. 7574; Egg Harbor, September 19, 1897, *Pollard* (NY); sandy roadside at Mullica River, Burlington Co., *F. J. Hermann*, no. 3937; open pine woods, Maple Crossway, Atsion, Burlington Co., August 10, 1926, *Benner, Long & Bassett;* Pine Barrens, near Shamong, Burlington Co., August 6, 1887, *C. F. Parker.* ONTARIO: woods, Sandwich, July 25, 1901, *J. M. Macoun*, no. 34,072a. OHIO: prairie, Oxford Springs, Erie Co., August 31, 1902, *Moseley* (US); Perkins, Erie Co., September 28, 1898, *Moseley* (US); 2¾ miles northwest of Whitehouse, Lucas Co., October 19, 1919, *Moseley;* Neapolis, Lucas Co., September 18, 1927, *Moseley.* INDIANA: shore of the pre-glacial Lake Maumee, 3 miles south of Fort Wayne, Allen Co., *Deam*, no. 14,526; dry sandy fields, North Judson, Starke Co., August 29, 1894, *E. J. Hill* (NY); dryish sands bordering sloughs, Dune Park, November 27, 1905, *Hill* (Field); moist sands, Dune Park, November 27, 1905, *Hill* (Field); Millers, Lake Co., October 1, 1881, *Hill* (NY); in a black oak woods, just west of Thayer, Newton Co., *Deam*, no. 21,395. PLATE 491, FIG. 2; MAP 23.

Var. **ramosissima**, var. nov. Rami basilares eis varietatis typicae similes sed pauciores; caules fructiferi 35–80 cm. alti; panicula valde supra medium caulem subdeltoidea vel globosa; rami inferiores saepe longissimi valde patuli; fructus in racemos sparsos dispositi, rami fructiferi longissimi; pedicelli calyces superantes; calyx purpureo-viridis cuneato-obovoideus 1.6–1.8 mm. longus et latus capsulam non obscurans; sepala interiora quam valvae angustiora; semina 2 (3), 1–1.2 mm. longa dorsiventraliter compressa anguste ovoidea subaequilateralia.—Open woods, sandy and peaty areas, dry or damp

Map 21, range of Lechea stricta; 22, of L. Leggettii, var. typica; 23, of L. Leggettii, var. moniliformis; 24, of L. Leggettii, var. ramosissima; 25, of L. intermedia, var. typica; 26, of L. intermedia, var. juniperina; 27, of L. intermedia, var. laurentiana; 28, of L. intermedia, var. depauperata.

situations, Atlantic Coastal Plain, eastern Virginia to Florida, west to Louisiana. The following specimens are characteristic. VIRGINIA: border of woods, south of Melfa, Accomac Co., *Fernald, Long & Fogg*, no. 5379; bushy clearings and borders of woods, west of Hampton *Fernald, Long & Fogg*, no. 4949; dry pine barrens, Cape Henry, *Fernald & Griscom*, no. 2854; near Virginia Beach, *T. H. Kearney*, Jr., no. 2041 (US); Virginia Beach, September 15, 1907, *Bartram & Long* (US); pine woods, Virginia Beach, *Fernald & Long*, no. 4050; damp sandy and peaty depressions back of the dunes, Rifle Range, south of Rudy Inlet, Princess Anne Co., *Fernald & Long*, no. 4048; dry woods, Creeds, Princess Anne Co., *K. K. Mackenzie*, no. 1786 (NY); dry pine woods, Macon's Corner, Princess Anne Co., *Fernald & Griscom*, no. 2855; dry pinelands about 4 miles northwest of Waverly, *Fernald & Long*, no. 6283; moist pinelands and clearings southeast of Waverly, *Fernald & Long*, nos. 7537 and 7538. NORTH CAROLINA: Edenton, Chowan Co., *Kearney*, no. 1885 (US); sandy banks, near Beaufort, *I. F. Lewis*, no. 185 (NY). SOUTH CAROLINA: damp mucky peaty open thicket, 2 miles north of Lake City, Florence Co., *Wiegand & Manning*, no. 2069. GEORGIA: damp sandy scrubby field, Liberty Co., *Wiegand & Manning*, no. 2071; rather dry pine-barrens, Thomas Co., *Harper*, no. 1177; near Brinson, Decatur Co., *Harper*, no. 1927 (US). FLORIDA: St. Augustine, winter of 1872–73, *M. C. Reynolds* (NY); Flatwoods, Lake City, Columbia Co., *Nash*, no. 2185 (NY); pine-barrens, St. Marks, *Curtiss*, no. 6847. ALABAMA: Spring Hill, August 9, 1897, *Bush*, no. 160 (NY). MISSISSIPPI: dry sandy soil, Waynesboro, October 2, 1896, *Kearney* (NY); Ocean Springs, Jackson Co., *Pollard*, no. 1109 (TYPE in Gray Herb.); Biloxi, July 23, 1897, *C. F. Baker*, no. 698 (NY). LOUISIANA: open pine land, 1 mile north of Abita Springs, Saint Tammany Parish, *F. W. Pennell*, no. 4162 (NY). PLATE 491, FIG. 3; MAP 24.

Lechea Leggettii had been included by many, perhaps most, of the American authors before Leggett in the "protean L. minor" to use the words of Britton. Its close resemblance to *L. intermedia* is shown by the fact that it was not until the appearance of Britton's monograph that they were separately described. Britton[1] cited "*Lechea minor* Lam. Tabl. Encycl. T. 52, fig. 1 (1791)" as a synonym of his *L. Leggettii*. The difficulty of assigning this to any particular species of *Lechea* has been discussed under *L. minor* and unless Britton had seen the type-specimen of Lamarck (which he does not state) it seems to me that his inclusion of it here is but a matter of guesswork. I prefer to disregard it. Britton, p. 251, states that the types of *L. Leggettii* are in the Columbia College Herbarium. These include, presumably, the specimens there assembled by Leggett, Britton and

[1] Bull. Torr. Bot. Cl. xxi. 251 (1894).

perhaps other early collectors. Practically all of them are what I call var. *typica* and consequently the selection of a type for this variety is a relatively simple matter. It is interesting to note that Bicknell,[1] speaking of *L. Leggettii*, wrote "I take to be typical of the latter the plant that I used to find among the hills and rocky outcroppings along the Hudson near New York and which, found also in New Jersey and on Staten Island, largely make up the material studied by Leggett and by Britton & Hollick."

Like *Lechea intermedia, L. Leggettii* is quite variable and to a slight extent, at least, migrating into recently glaciated territory inland from the Coastal Plain.

Lechea Leggettii var. *moniliformis* comprises the greater part of the species on Nantucket Island, Long Island, in southern New Jersey and around Lake Erie and Lake Michigan. It is characterized by the possession of basal leaves larger and broader than in the var. *typica*, by having the fruits disposed evenly in racemes (not usually crowded or condensed towards the tips of the branches as in the var. *typica*), and by having the calyx much longer than broad and distinctly pyriform and purplish in color (not cuneate-obovoid and brownish-green as in the var. *typica*). Bicknell[1] says of this variety "The type specimens, as well as others like them from Long Island, mark a pronounced departure from typical *L. Leggettii*. Other specimens from Nantucket and Long Island are less distinctive and I am in doubt whether it is well to rate the plant as other than a variety of the common species. Nevertheless, it has points of distinction which need no second glance to impress anyone who may be familiar with the common inland form of the species, for *L. moniliformis* would appear to be a plant of the coastal plain . . . Moreover it shows this difference in habit from the more inland plant of dry open places and hilly ground, that it is of low grounds often of wet and brackish soils. A better knowledge may show that its distinctive name should be restored, but for the present let it be merged with *L. Leggettii*." In further support of this plant being a good variety is the fact that practically all of the specimens from northern Ohio, near Lake Erie, and from near the southern end of Lake Michigan in Indiana have the characters belonging to it. The plants of these areas, particularly of that at the southern end of Lake Michigan, frequently show a strong relation to or identity with the flora of the Coastal Plain. Bicknell

[1] Bull. Torr. Bot. Cl. xl. 619 (1913).

was prone to make too much of slight differences between Lecheas. His *L. juniperina*, which after much field- and laboratory-study, I regard as a strong geographic variety, differing in several details from the species, is an example of his view of what constitutes a species. When, as in this instance, he felt that there was much intergrading between *L. Leggettii* and his *L. moniliformis* he combined the two rather than make a formal variety of the latter.

The decidedly disrupted distribution along the Coastal Plain and the considerable segregation of the Great Lakes area indicates a considerable age for the variety and a segregation and isolation since the downwarping of the northern Coastal Plain.

The widely distributed var. *ramosissima* of the Coastal Plain from Virginia to Florida and west to Louisiana is more nearly related to var. *moniliformis* than to var. *typica*. It differs from the former in having a less elongate calyx and a more broadly branched habit and typically 2, rather than 3, seeds in a capsule, differences which serve to separate it as a geographic variety. In habit the plant is rather close to *L. Torreyi* which, of course, is easily distinguished by the strong gray pilosity on the calyces and by the 4–6 seeds.

17. L. INTERMEDIA Leggett. Caudex mostly simple: basal shoots in late August to November, subprocumbent to assurgent, 2–7 (commonly 3–5) cm. long; the axis sparsely to densely subappressed-pilose: basal leaves elliptic- to oblong-lanceolate, sparingly to inconspicuously subappressed-pilose on midrib and margin on the lower surface, glabrous on the upper, 3–7 (–8) mm. long, 0.8–2 mm. wide, 2-ranked and mostly in one plane, parallel to the ground or broadly spreading from all sides of the shoot, scattered or subverticillate to verticillate: fruiting stems one to many, 15–60 cm. high, branching mostly above the middle, often in the upper third: panicles narrowly subcylindric to spire-shaped; branches short, openly spreading-ascending, 2–8 cm. long or crowded and strongly ascending to suberect: cauline leaves oblanceolate, abruptly acute to pointed, 1–2.5 cm. long, 1.5–4.5 mm. broad, glabrous on the upper surface, with short subappressed prominent to inconspicuous hairs on the midrib and margin on the lower surface; rameal leaves similar but smaller and more narrowly lanceolate: axes of stem and branches finely subappressed-pilose: fruits secund or clustered at the tips of the branches: pedicels sparsely subappressed-pilose with very short hairs, 1.5–3 mm. long, of the clustered fruits frequently shorter: calyx prominently appressed-pilose, ovoid to globose and somewhat pyriform or depressed-globose, 1.9–2.3 mm. broad, 1.9–2.1 mm. long; the interior sepals not keeled, 3–5-nerved, ovate, obtuse, about as broad as long, or 3-nerved, elliptic, subacute and longer than broad; outer sepals inconspicuous, linear, from one-

half to three-quarters as long as the inner: stamens of an indefinite number; capsule broadly ovoid to depressed-globose, 1.9–2 mm. long, 1.8–2.1 mm. broad: seeds pale- to medium-brown, when mature with a thin membranaceous coat mostly adhering closely but in places drawn away, forming a reticulum, 4–6 in number, 1.1–1.3 mm. long, 0.6–0.75 mm. broad, 3-sided and prominently angled, considerably broadened and thickened toward the base or with base and apex similar, the dorsal surface strongly convex, the two lateral faces nearly flat, subequal to quite unequal, converging sharply in a straight keel.

a. Calyx and mature capsules depressed-globose; the capsule conspicuous, equaling to exceeding the calyx: interior sepals broadly ovate, obtuse or subobtuse, 5–3-veined: panicles mostly openly branched: capsules opening in mid- to late autumn..... Var. *typica.*

a. Calyx and mature capsules globose to broadly ellipsoid: calyx slightly pyriform, exceeding the capsule: interior sepals elliptic-ovate and subacute, 3-veined: plants densely and closely branched: capsules opening in early autumn....*b.*

b. Fruiting stems suberect to erect, more than 12 cm. long. Basal leaves sparsely subappressed- to spreading-pilose on midrib and margin beneath from the first, becoming nearly or quite glabrous on the margin, the midrib remaining slightly pilose, frequently 4-ranked, in conspicuous approximate to remote whorls, elliptic-lanceolate, uniformly narrowed to the acute apex and base, 3 (frequently) to 5 times as long as broad. Var. *juniperina.*

Basal leaves at first strongly subappressed to spreading-pilose beneath, retaining a prominent pilosity on midrib and margin, mostly 2-ranked in crowded obscure whorls or scattered, lanceolate to oblanceolate, more than 4 times as long as broad..... Var. *laurentiana.*

b. Fruiting stems decumbent to arched-ascending, less than 12 cm. long..... Var. *depauperata.*

Var. **typica.** Basal shoots 2–6 cm. long, mostly subprocumbent; the axis strongly subappressed-pilose: basal leaves oblong to lanceolate, acute, abruptly narrowed at base and apex, mostly dull-green, conspicuously subappressed- to spreading-pilose on the lower surface on midrib and margin, 3–7 (–8) mm. long, about one-fourth as broad, spreading mostly in one plane, subverticillate, whorled or scattered but appearing as though 2-ranked and not whorled: fruiting stems one to several, 15 cm. (occasionally in one-year plants) to 60 cm. tall; the branches spreading-ascending, 3–8 cm. long: panicles open, subcylindric: fruits scattered along the primary or secondary branches or loosely clustered toward their tips: cauline leaves spreading, those below the inflorescence falling early: pedicels 1.5–3 mm. long: calyx of the fruit mostly depressed-globose, broadest near the base, 2.1–2.3 mm. broad, about 2 mm. long; inner sepals broadly ovate, obtuse; capsule exceeding the calyx, 1.9–2 mm. long, 2–2.1 mm. broad: seeds 4–6 (mostly 5–6), 1.1–1.2 mm. long, about 0.6–0.7 mm. broad, broad-

ened and thickened toward the base, the two lateral faces unequal, that appressed to the dissepiments slightly rounded.—*L. intermedia* Leggett in Britton in Bull. Torr. Bot. Cl. xxi. 252 (1894); Robinson in Gray, Syn. Fl. N. Am. i[1]. 193 (1895); Britton in Britton & Brown, Ill. Fl. ii. 444, fig. 2481 (1897); Britton, Man. 633 (1901); Grosser in Engler, Pflanzenr. iv[193]. 139 (1903); Robinson & Fernald in Gray, Man. ed. 7: 578 (1908); Victorin, Fl. Laurent. 271 (1935), in part. *L. minor* sensu Pursh, Fl. Am. Sept. ii. 91 (1814), at least in part; sensu Hooker, Fl. Bor. Am. i. 72 (1830); sensu Watson in Gray, Man. ed. 6: 77 (1890), in part; not L.; probably *L. minor* of most other early Am. authors, in part, not L. *L. Leggettii* var. *intermedia* Britton & Hollick, Prelim. Cat. Pl. N. J. 6 (1888), name only.—Dry open woods and sterile fields, Prince Edward Island and Nova Scotia to the mountains of Virginia, west to Minnesota, the Black Hills of South Dakota and northern Nebraska (along the Atlantic slope mostly inland). The inclusion of the following citations from New Brunswick, Nova Scotia, Maine and New Hampshire, where their ranges may coincide, will serve to make more clear the distinctions between var. *typica* and var. *juniperina*. It is unnecessary to cite material from west and south of the range of the latter. New Brunswick: Kent Co., July 22, 1870, *J. Fowler;* Kouchibouguac, October 6, 1873, *Fowler;* Escuminac, Miramichi, August 11, 1894, *Fowler* (US). Nova Scotia: Boylston, July, 1890, *C. A. Hamilton*, no. 18,304; dry barren hillsides, Kentville, Kings Co., August 22, 1902, *Fernald;* near Mahone Bay, autumn of 1891, *Hamilton*, no. 18,431; dryish open sand plains, Middleton, Annapolis Co., *Fernald, Pease & Long*, no. 21,890; dry rocky or gravelly barrens, near Clement Pond, Barrington, Shelbourne Co., *Fernald, Long & Linder*, no. 21,894; dry rocky barrens, Pubnico, Yarmouth Co., *Fernald, Long & Linder*, no. 21,895. Maine: gravelly bank, Veazie, Penobscot Co., August 19, 1897, *Fernald;* dry thicket, Milford, Penobscot Co., *Fernald & Long*, no. 14,122; Schoodic Peninsula, *Redfield*, no. 15,327 (Mo); Mount Desert, August 20, 1897, *E. P. Bicknell* (NY); among blueberry bushes, Blue Hill, Hancock Co., *A. R. Hodgdon*, no. 689; Deer Isle, Deer Island, Hancock Co., *Hodgdon*, no. 694; roadside, Camden, August 9, 1902, *G. G. Kennedy;* Cumberland, September 25, 1858, *J. Blake* (Field); York Harbor, August 21, 1896, *Bicknell;* damp roadside, South Berwick, *Hodgdon*, no. 478. New Hampshire: dry sandy bank, Dalton, Coos Co., *A. H. Moore*, no. 4366; sand plain, South Tamworth, Carroll Co., *Hodgdon*, no. 505; Holderness, October 8, 1886, *E. & C. E. Faxon;* sandy river terraces above Plymouth, Grafton Co., *Fernald*, no. 11,809; white pine woods, Milton, Strafford Co., *Hodgdon*, no. 687; lichen barrens in open pine woods, near Piscataqua River, *Hodgdon*, no. 700; Heniker, *B. L. Robinson*, no. 900; Jaffrey, *Robinson*, no. 44. The type in Herb. N. Y. Bot. Gard. is the specimen of *T. C. Porter*, Pocono Mountain, Monroe Co., August 23, 1859. Plate 491, figs. 4–6; map 25.

Var. JUNIPERINA (Bicknell) Robinson. Basal shoots in August and early September; the axis sparingly subappressed- to spreading-pilose: basal leaves mostly 4-ranked, elliptic-lanceolate, acute, 3–4 times as broad as long, bright-green, sparsely subappressed-pilose beneath mostly on the margin: branches of the inflorescence crowded, often strongly ascending, forming, often, a dense spire-like inflorescence: fruits mostly crowded on the upper halves of branches; calyx subglobose to slightly pyriform, broadest at about the middle: sepals ovate to elliptic-ovate, subacute, exceeding the capsule: capsules subglobose; valves oblong-ovate, broadly spreading in maturity: seeds 5–6, slightly enlarged at the base, nearly equilateral, 1–1.1 mm. long.—*L. juniperina* Bicknell in Bull. Torr. Bot. Cl. xxiv. 88 (1897); Britton in Britton & Brown, Ill. Fl. ii. 444, fig. 2482 (1897); Britton, Man. 633 (1901); Britton in Britton & Brown, Ill. Fl. ed. 2, ii. 545, fig. 2921 (1913).—Open woods and fields in poor soil, Cape Breton Island to southern New Hampshire, near the sea or in river-valleys, particularly abundant on headlands and islands of the Maine Coast. NEW BRUNSWICK: Grand Lake, September 16, 1879, *J. Fowler;* by the St. John River, Upper Queensbury, York Co., *Fernald & Pease*, no. 25,182; dry soil, St. Andrews, August 22, 1909, *A. B. Klugh*, no. 14. NOVA SCOTIA: sand dunes, Dingwall, Cape Breton Island, *G. E. Nichols*, no. 1897; dry rocky barrens, Armdale (Dutch Village), Halifax Co., *Fernald, Bartram & Long*, no. 24,171. MAINE: gravel and ledges, Pushaw Bridge, Oldtown, Penobscot Co., September 18, 1897, *Fernald;* dry field, Newburg, September 7, 1904, *O. W. Knight*, no. 92; dry sand, Strong, Franklin Co., August 13, 1901, *C. H. Knowlton;* Gilead, August 7, 1897, *K. Furbish;* Screw Auger Falls, Grafton Notch, July 26, 1895, *E. F. Williams;* Roque Bluff, Washington Co., August 28, 1924, *C. H. Knowlton;* blueberry-barrens, Machias, Washington Co., *A. R. Hodgdon*, no. 692; roadsides, Northeast Harbor, Mount Desert Island, *Redfield*, no. 16,066 (NY); Blue Hill, Hancock Co., *Hodgdon*, no. 690; Stonington, Deer Island, Hancock Co., *Hodgdon*, no. 695; Matinicus, Knox Co., *C. A. E. Long*, no. 81; dry ground, Monhegan Island, Lincoln Co., August 27, 1921, *J. R. Churchill* (Mo); Sawyers Island, Boothbay, Lincoln Co., *Hodgdon*, no. 486; sterile, rocky field, Pemaquid, *Hodgdon*, no. 487; sandy soil, Auburn, July, 1898, *E. D. Merrill* (NY); sandy barren, Cape Popham, Sagadahoc Co., August 6, 1894, *Fernald;* damp, rocky roadside, Harpswell, *Hodgdon*, no. 484; Deering, October 7, 1878, *G. E. Davenport* (NY); meadow, near Fortune Rocks, Biddeford, August 26, 1899, *G. G. Kennedy;* downs, near the sea, York Harbor, August 13, 1892, *Bicknell;* in white sands on the shore, York Harbor, August 19, 1894, *Bicknell* (part of TYPE) (NY); York Harbor, August 23, 1894, *Bicknell* (part of TYPE) (NY); dry sterile field along highway, Wells, *Hodgdon*, no. 467; sandy roadside, toward Berwick, North Berwick, *Hodgdon*, no. 470. NEW HAMPSHIRE: Shelburne, October 11, 1902, *W. Deane;* gravelly soil, Prospect Ledge, Gorham, *A. H. Moore*, no. 4273; dry

sterile soil, Dover Point, Dover, Strafford Co., *Hodgdon*, no. 499; summit, Mount Major, Alton, *H. E. Sargent*, no. 36; dry roadside, Exeter, Rockingham Co., *A. S. Pease*, no. 14,028; roadside near sea, Rye, Rockingham Co., *Hodgdon*, no. 724. PLATE 491, FIGS. 7 and 8; MAP 26.

Var. **laurentiana**, var. nov. Folia ramorum basilarium obscure verticillata vel alternata plerumque dense disposita lanceolata vel anguste oblanceolata, plus quam 4-plo longiora quam lata, costa et margine subtus valde pilose pilis subadpressis vel patulis; panicula anguste subcylindrica compacta; rami breves valde ascendentes; fructus glomerati vel in racemum densum dispositi; calyx subpyriformis capsulam ovoideam vel subglobosam superans; sepala elliptico-ovata subacuta.—*L. intermedia* Victorin, Fl. Laurent. 271 (1935), in greater part.—Dry, mostly sandy soil, open woods, river-banks and lake-shores, valleys of the upper St. Lawrence and Ottawa Rivers and along the tributaries of the St. Lawrence River in New York and Ontario. QUEBEC: sur les grands plateaux de sable, près des Trois Rivières, Les Forges, *Victorin*, no. 18,530; sand plains northwest of Three Rivers, Cap Magdaleine, Champlain Co., August 1, 1923, *Chamberlain & Knowlton;* champs sablonneux abandonnés, Saint-Joseph-de-Sorel, *Victorin*, no. 28,080; along railroad, vicinity of Longueuil, *Victorin*, no. 8319 (TYPE in Gray Herb.); les Grèves, sur les sables à la lisière du bois, De Verchères, Contrecoeur Co., *Victorin & Rolland-Germain*, no. 33,922; sur les sables du terrain de la pépinière, Berthier, *Victorin & Rolland-Germain*, no. 44,615; rivage du Lac Lapêche, Wakefield, *Rolland-Germain*, no. 25,235; shores of Ottawa River, Blueberry Point, Aylmer, *Rolland-Germain*, no. 6223; Lac McGregor, environs d'Ottawa, *Victorin*, no. 10,117; Waltham, Comté de Pontiac, *Victorin, Rolland-Germain & Mellieur*, no. 44,049. NEW YORK: on Cambrian (Potsdam) sandstone or Aridondack gneiss, Narrows Island, Black Lake, St. Lawrence Co., *Fernald, Wiegand & Eames*, no. 14,393; sandy shore, Long Lake, Hamilton Co., *House*, no. 18,509. ONTARIO: Petawawa, Comté de Renfrew, *Victorin, Rolland-Germain & Meilleur*, no. 45,364; dry cliffs, Cattle Island, Temagami Forest Reserve, *W. R. Watson*, no. 1276; near Smuggler's Cove, Leeds Co., September 4, 1905, *E. P. Bicknell* (NY). PLATE 491, FIGS. 9–11; MAP 27.

Var. **depauperata**, var. nov. Caules fructiferi numerosi decumbentes vel arcuato-ascendentes 3–12 cm. longi ramosi vel simplices, rami valde ascendentes vel adpressi 1–3 cm. longi; rami steriles basilares numerosi brevissimi 0.5–2 cm. longi; folia 1.5–3 mm. longa late aut anguste lanceolata vel oblanceolata acuta; folia caulina brevissima dense disposita subadpressa oblanceolata 5–7 mm. longa 0.8–1.5 mm. lata; fructus pauci pyriformes.—Represented by a single collection from western Canada. SASKATCHEWAN: in old burn, open woods of small Jack Pines, near Archibald River, south shore of Lake Athabasca, July 31, 1935, *H. M. Raup*, no. 6745 (TYPE in Gray Herb.). PLATE 491, FIGS. 12 and 13; MAP 28.

Lechea intermedia Leggett was included in the broadly interpreted *L. minor* from the time of Linnaeus until Leggett and Britton[1] separated it. Britton has discussed the problem of typification of *L. minor* L. The generalized and meagre descriptions of the American authors following Linnaeus and to the time of Leggett served to separate *L. minor* (*L. thymifolia* Michx.), *L. villosa* and usually *L. tenuifolia* and *L. racemulosa*. The somewhat similar, probably closely related, eastern species, *L. intermedia*, *L. Leggettii* and *L. maritima*, and occasionally *L. racemulosa* and *L. tenuifolia*, were, during this time, placed together as the polymorphic species, *L. minor*. There is virtually nothing in the descriptions of any of the earlier authors to enable one exactly to place a specimen of any of the first three. Hooker,[2] obviously by the range given, had *L. intermedia* at hand but the description does not prove it. Robinson[3] states that the *L. minor* Lam. "is a poor and dubious sketch." My own study of the figure leaves me with an equally indefinite idea of what Lamarck meant. It is best to drop this from the synonymy of any of the species of the genus.

Lechea intermedia var. *juniperina* was proposed as the species *L. juniperina* by Bicknell in 1897.[4] He studied it particularly in the immediate vicinity of York, Maine, and made numerous collections from there. He noted some rather striking differences between it and typical *L. intermedia*, despite the fact that he had, presumably, never seen var. *juniperina* as it occurs in late autumn when fully mature and with its most outstanding characteristics revealed. Late in the fall, when the capsules are completely ripe and their valves separate and spread very broadly, this variety, as I have seen it along the coast from Penobscot Bay to southern New Hampshire appears to be distinct enough, at times, to justify Bicknell's evaluation of it. The numerous intergrades, however, between it and typical *L. intermedia*, and the fact that, until nearly complete maturity, the two are hardly separable, except by minute and obscure characters, compel me to regard *L. juniperina* as a variety of *L. intermedia*. The presence of like characters (similarity in shape, number and markings) in seeds of both is the most convincing proof, to me, of their close relationship.

The most important diagnostic characters are, the narrowly ovate and acute to subacute interior sepals, the globose capsule which is ex-

[1] Bull. Torr. Bot. Cl. xxi. 252 (1894).
[2] Fl. Bor. Am. i. 72 (1830).
[3] Gray, Syn Fl. N. Am. I². 193 (1895).
[4] Bull. Torr. Bot. Cl. xxiv. 88 (1897).

ceeded by the sepals and the narrowly lance-elliptic and usually bright-green basal leaves which on the lower surface are but sparsely pilose on midrib and margin or nearly glabrous. Typical *Lechea intermedia* has broader and more obtuse sepals which are about equal to or shorter than the depressed-globose capsule and darker green (often purplish) and decidedly oblong basal leaves.

On the headlands and islands of the Maine Coast this variety is decidedly abundant, occurring frequently in pure stands. Inland it appears in mixed colonies with *L. intermedia* var. *typica*. Whereas the latter occurs mostly as scattered individuals, the var. *juniperina* grows mostly in dense colonies, either in open woods or along roads where it is particularly abundant.

The variety *laurentiana*, though closely resembling in habit *L. intermedia* var. *juniperina*, differs from it by having the more crowded and frequently narrower lanceolate to oblanceolate leaves prominently pilose beneath on midrib and margin, approaching in these respects *L. intermedia* var. *typica*. From the latter it differs markedly, however, in having the calyx exceeding the capsule. As in *L. intermedia* var. *juniperina*, the capsules are ovoid or subglobose, rather than slightly depressed-globose. The seeds, moreover, are somewhat narrower and less enlarged basally than those of the var. *typica*.

In the summer of 1935, Dr. H. M. Raup discovered a new area for *Lechea* several hundred miles north of the nearest recorded station for the genus (at or near Lake Winnipeg[1]). So different in appearance are his numerous specimens from what we expect in our latitude that a close study of the fruit was necessary to establish their relationship in the genus. Dissection of the fruit shows the seeds to have the membranaceous covering present at maturity in *L. intermedia* and its varieties and not found elsewhere in the genus, except in some localized species of Florida.

The most striking characters of this northwestern variety are the extreme dwarfness of the vegetative parts and the great reduction in number of flowers and fruits. The fruiting stems, in fact, average only a few cm. in height and seem to be but little more than exaggerated basal shoots ascending at the tips and bearing fruits either along the principal axes or on very short branches. The cauline leaves are persistent until maturity to the base and there grade into the basal leaves. There is not the abrupt transition from basal to cauline leaves that one finds elsewhere in the species.

[1] Hooker, Fl. Bor.-Am. i. 72 (1830).

The calyces are rather more densely appressed-pilose than in the other varieties and with a yellowish-white rather than a white or grayish-white pilosity. The color of the hairs on the calyces of the various species of *Lechea* vary slightly but, insofar as slight difference may be seen, they seem to hold fairly well in a given species. Dr. Raup tells me that the burned-over area now supporting a young Jack Pine forest, in which the specimens of *Lechea* were found, is perhaps a square mile in extent. Not even the largest specimens from this area approach in size the very smallest specimens of *Lechea* that I have seen in New England. Most of the capsules had attained their mature proportions but their seeds were largely in an immature state at the time of collecting. The very few capsules which had mature seeds showed only 3–5 of them, hardly, however, giving a fair indication of the average.

Explanation of Plates

(Fruiting parts, × 8; seeds, × 10; basal shoots, × 4)

Plate 488. Lechea san-sabeana (Buckl.) Hodgdon: fig. 1, mature fruit, capsule and dissepiments, from Hempstead, Texas, *E. Hall*, no. 31; fig. 2, seeds from no. 31; fig. 3, type-specimen, × 1/5, from San Saba County, Texas, *Buckley*.

L. villosa Ell., var. typica: fig. 4, cluster of fruits from West Roxbury, Massachusetts, October 9, 1885, *E. Faxon;* fig. 5, individual fruits and separate capsules from the same plant as fig. 4; fig. 6, seeds from the same plant.

L. villosa, var. macrotheca, n. var.: fig. 7, cluster of fruits from Cleo Major County, Oklahoma, *G. W. Stevens*, no. 1728 (type); fig. 8, seeds from the type.

L. racemulosa Michaux: fig. 9, seeds from Atsion, New Jersey, *F. J. Hermann*, no. 3942.

Plate 489. L. mensalis, n. sp.: fig. 1, type, × 2/5, from Chisos Mountains, Texas, *C. H. Mueller*, no. 8102; fig. 2, branch with fruit from type; fig. 3, capsules from type; fig. 4, seeds from type.

L. tenuifolia Michaux: fig. 5, branch with fruits, and one separated capsule, from Ashaway, Washington County, Rhode Island, September 1, 1919, *Fernald, Woodward & Collins;* figs. 6 and 7, seeds from the same collection.

L. tenuifolia var. occidentalis, n. var.: fig. 8, fruits and capsule, from Pottawatomie County, Kansas, *J. B. Norton*, no. 80 (type); fig. 9, seeds from type.

L. Deckertii Small: fig. 10, branch with fruits, from Lemon City, Dade County, Florida, July, 1926, *R. F. Deckert* (type).

L. tripetala (Moç & Sess.) Britton: fig. 11, seeds from Rio Blanca, near Guadalajara, Jalisco, *Pringle*, no. 5171.

Plate 490. L. divaricata Shuttleworth: fig. 1, seeds from Eau Gallie, Indian River, Florida, *Curtiss*, no. 5709.

L. cernua Small: fig. 2, upper surface of basal leaf (large) and a rameal leaf (small), from near Sebastian, Florida, *Small, Small & DeWinkeler* (type); fig. 3, branch with fruits, from type; fig. 4, seeds from near Kuhlman, De Soto County, Florida, December 13, 1920, *Small & DeWinkeler*.

L. cubensis Leggett: fig. 5, seeds, from La Grifa (Pinar del Rio), Cuba, *C. Wright*, no. 3518 (type).

L. Torreyi Leggett: fig. 6, branch with fruits, from St. Augustine, Florida, March, 1872, *John Torrey* (type)

L. TORREYI, var. CONGESTA, n. var.: FIG. 7, branch with fruits, from Duval County, Florida, *A. H. Curtiss*, no. 232*

L. MARITIMA Leggett, var. TYPICA: fig. 8, basal shoot from Forest Hills, Massachusetts, October 9, 1885, *E. & C. E. Faxon.*

L. MARITIMA, var. VIRGINICA, n. var.: FIG. 9, seeds from Virginia Beach, Virginia, September 26 and 27, 1890, *Hollick & Britton* (TYPE).

PLATE 491. L. LEGGETTII Britton & Hollick, var. TYPICA: FIG. 1, branch with fruits, from Slatington, Lehigh County, Pennsylvania, *Pretz*, no. 13,156.

L. LEGGETTII, var. MONILIFORMIS Bicknell: FIG. 2, branch with fruits, from Squam, Nantucket Island, Massachusetts, September 18, 1899, *Bicknell* (TYPE).

L. LEGGETTII, var. RAMOSISSIMA, n. var.: FIG. 3, seeds from Ocean Springs, Mississippi, *Pollard*, no. 1109 (TYPE).

L. INTERMEDIA Leggett, var. TYPICA: FIG. 4, fruit from West Roxbury, Massachusetts, October 9, 1885, *E. Faxon;* FIG. 5, seeds from same collection; FIG. 6, tip of basal shoot from same collection.

L. INTERMEDIA, var. JUNIPERINA (Bicknell) Robinson: FIG. 7, fruit from York Harbor, Maine, August 23, 1894, *Bicknell* (TYPE); FIG. 8, tip of basal shoot from Stonington, Deer Island, Maine, *Hodgdon*, no. 695.

L. INTERMEDIA, var. LAURENTIANA, n. var.: FIG. 9, fruit from vicinity of Longueuil, Quebec, *Victorin*, no. 8319 (TYPE); FIGS. 10 and 11, portions of basal shoots from the TYPE.

L. INTERMEDIA, var. DEPAUPERATA, n. var.: FIGS. 12 and 13, entire plants, × 2/5, from near Archibald River, south shore of Lake Athabaska, Saskatchewan, *Raup*, no. 6745 (TYPE).

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LECHEA SAN-SABEANA: FIG. 1, fruit, capsule and dissepiments, × 8; FIG. 2, seeds, × 10; FIG. 3, TYPE-SPECIMEN, × $\frac{1}{5}$.

L. VILLOSA, var. TYPICA: FIG. 4, fruits, × 8; FIG. 5, individual fruits and separate capsules, × 8; FIG. 6, seeds, × 10.

L. VILLOSA, var. MACROTHECA: FIG. 7, fruits, × 8; FIG. 8, seeds, × 10.

L. RACEMULOSA: FIG. 9, seeds, × 10.

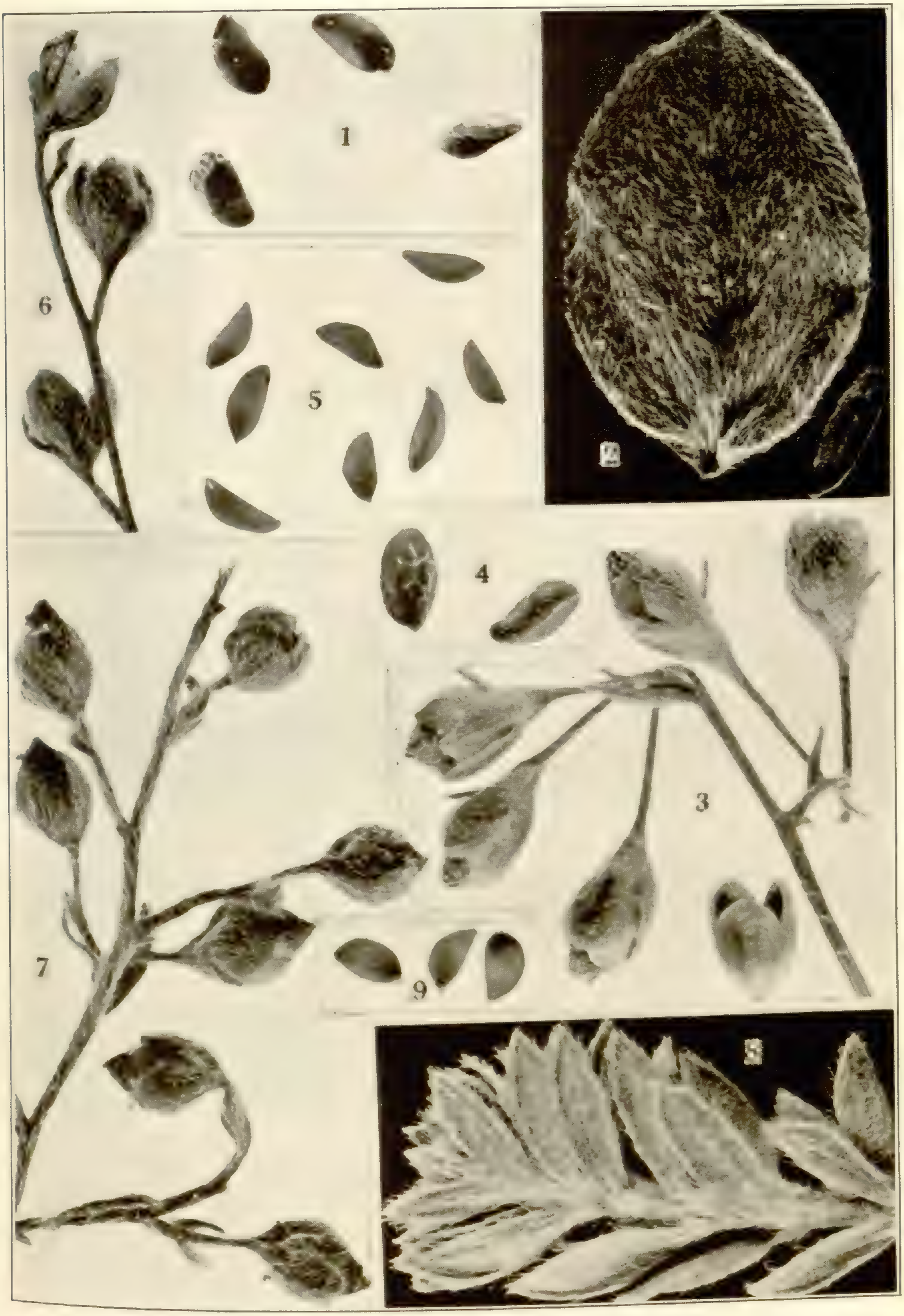
LECHEA MENSALIS: FIG. 1, TYPE, × $\frac{2}{3}$; FIG. 2, fruits, × 8; FIG. 3, capsules, × 8; FIG. 4, seeds, × 10.

L. TENUIFOLIA: FIG. 5, fruits and separated capsule, × 8; FIGS. 6 and 7, seeds, × 10.

L. TENUIFOLIA, var. OCCIDENTALIS: FIG. 8, fruits and capsule, × 8; FIG. 9, seeds, × 10.

L. DECKERTII: FIG. 10, fruits, × 8, from TYPE.

L. TRIPETALA: FIG. 11, seeds, × 10.



LECHEA DIVARICATA: FIG. 1, seeds, × 10.
L. CERNUA: FIG. 2, upper surface of basal leaf (large) and a rameal leaf, × 4, from TYPE; FIG. 3, fruits, × 8; FIG. 4, seeds, × 10.
L. CUBENSIS: FIG. 5, seeds, × 10.
L. TORREYI: FIG. 6, fruits, × 8, from TYPE.
L. TORREYI, var. CONGESTA: FIG. 7, fruits, × 8.
L. MARITIMA, var. TYPICA: FIG. 8, basal shoot, × 4.
L. MARITIMA, var. VIRGINICA: FIG. 9, seeds, × 10, from TYPE.

LECHEA LEGGETTII, var. TYPICA: FIG. 1, fruits, × 8.

L. LEGGETTII, var. MONILIFORMIS: FIG. 2, fruits, × 8, from TYPE.

L. LEGGETTII, var. RAMOSISSIMA: FIG. 3, seeds, × 10.

L. INTERMEDIA, var. TYPICA: FIG. 4, fruit, × 8; FIG. 5, seeds, × 10; FIG. 6, tip of basal shoot, × 4.

L. INTERMEDIA, var. JUNIPERINA: FIG. 7, fruit, × 8, from TYPE; FIG. 8, tip of basal shoot, × 4.

L. INTERMEDIA, var. LAURENTIANA: FIG. 9, fruit, × 8, from TYPE; FIGS. 10 and 11, portions of basal shoots, × 4, from TYPE.

L. INTERMEDIA, var. DEPAUPERATA: FIGS. 12 and 13, entire plants, × $\frac{2}{5}$, TYPE.

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I. GONOLOBUS WITHIN THE GRAY'S MANUAL RANGE

LILY M. PERRY

(Plate 494)

ALMOST two years ago Professor Fernald, working over his collection from Virginia, laid aside as perplexing a specimen belonging to the genus *Gonolobus* Michx. Fl. Bor.-Am. l. 119 (1803), i. e. *Vincetoxicum* Walt. Fl. Carol. 13, 104 (1788). Although there is no doubt as to the priority of Walter's name, nevertheless the continued use in Europe of *Vincetoxicum* Moench, Method. 717 (1794) produces a nomenclatural confusion of generic names which calls for some deliberation. Further, the situation was not covered in the statement of the cases for "Conservation of later Generic Homonyms," Kew Bull. (1935). Since the question must be settled sooner or later for the coming issue of the Manual, Professor Fernald requested that I assemble the literature and specimens immediately available for this study. The outcome of this work is briefly given below.

A proposal for the conservation of *Gonolobus* Michaux against *Vincetoxicum* Walter was submitted to Miss M. L. Green, Secretary of the Special Committee on Phanerogamae and Pteridophyta. Her reply is as follows, "the better way is to conserve Vincetoxicum Moench, Method. 717 (1794); if this is conserved, then Vincetoxicum Walt. becomes a nomen rejiciendum and Gonolobus becomes the right name for the genus." She cited fifteen additional references for *Vincetoxicum* Moench and added, "I am sure you will agree that the conservation of Vincetoxicum Moench is very desirable and thus it is

the simplest way to solve all difficulties." Again in another letter she pointed out that "The European Vincetoxicum is so widely used that there is every chance of its being conserved."

Superficially this seems to clear the way to use the name *Gonolobus* for our plant of southeastern United States. Unfortunately, at different times two entirely unlike concepts have been accepted for the genus: (1) Michaux's original as interpreted by Professor Asa Gray, Proc. Amer, Acad. xii. 75–79 (1877), Syn. Fl. ed. 1 and ed. 2, ii[1]. 102 (1878 and 1886); and (2) that of Miss Anna Murray Vail, Bull. Torr. Bot. Club, xxvi. 425–431 (1899). Many botanists earlier than A. Gray maintained *Gonolobus* as delineated by Michaux, nevertheless, Gray's particular interpretation is in sharp contrast with Miss Vail's, since both left evidence of a detailed examination of all the original material of the genus. Michaux's description of the genus *Gonolobus*, although slightly more amplified than that of Walter's *Vincetoxicum*, is unquestionably synonymous with the latter; in addition, Michaux specifically mentioned *V. gonocarpos* Walt. and *V. acanthocarpos* Walt. as synonyms of his *G. macrophyllus* and *G. hirsutus* respectively. In so doing, according to our present International Rules of Nomenclature, he invalidated his own specific names. The third species, *G. laevis*, is poorly described. The type material (fide Vail) is a mixture of flowers corresponding in part to Michaux's *G. laevis*, and foliage and fruit belonging to *Enslenia albida* Nutt., i. e. *Ampelamus albidus* (Nutt.) Britt. This fact was noted by both Miss Vail and Dr. Gray, each choosing a different part of the mixture as the type of the species.

Miss Vail, guided by foliar characters, chose the material of *Enslenia albida* Nutt.[1] By doing this, she believed she had cleared up the discrepancy between the original description of the species and the plants passing as such. Unfortunately, since she had restored Michaux's first two species to the genus *Vincetoxicum* Walt., she was compelled to use *G. laevis*, the only remaining species, in order to maintain the genus *Gonolobus*. That is, she took up the name *Gonolobus* in the sense of *Enslenia* Nutt. She did this apparently unmindful of the

[1] Rightfully the specimens of *Enslenia albida* Nutt. (*Gonolobus laevis* sensu Vail, Bull. Torr. Bot. Club, xxvi, 427 (1899), non Michx.) should be called *Ampelamus albidus* (Nutt.) Britt. as *Enslenia* Nutt. Gen. 1. 164 (1818) is antedated by *Enslenia* Raf. Fl. Ludovic. 35 (1817). Rafinesque called attention to this in Journ. Phys. lxxxix. 258 (1819) and Amer. Month. Mag. iv. 192 (1819), but Britton actually made the combination *Ampelamus albidus*, Bull. Torr. Bot. Club, xxi. 314 (1894) (as *Ampelanus*).

vast discrepancy between the floral characters (cf. particularly the contrast in the stigmas) of her chosen type and Michaux's original description of the genus. In this she has been followed by a number of American authors.

On the other hand, Dr. Gray, in his consideration of Michaux's third species, accepted that part of the material belonging to *Gonolobus* (excluding one flower-cluster of somewhat uncertain identity) as *G. laevis* and was content at that. By this interpretation *Gonolobus* Michaux is a thoroughly consistent and distinct genus. This is the concept first accepted by Robert Brown in his paper "On the Asclepiadaceae," Mem. Wern. Nat. Hist. Soc. i. 12–78 (1811), and by many later authors. On this basis the genus now contains over one hundred described species. Although approximately forty of these have been transferred to *Vincetoxicum* Walt. by Standley and others, *Gonolobus* is the name most widely known in literature and adopted by all who have done monographic work on the family.

The indication of a type-species should be a helpful factor in wholly re-establishing the older and original concept. Not having discovered any in the literature examined, I am here choosing *G. macrophyllus*, the first of the three described by Michaux, as the standard-species of the genus. This species has not only the (usually) angled pod (from which character the name is derived) but also the more important generic character of the flattened stigma. *G. macrophyllus* has been somewhat buffeted about. Gray regarded it as a variety of *G. laevis*, and Michaux automatically created an invalid name by citing *V. gonocarpos* Walt. as a synonym. Nomenclaturally the species appears to be *G. gonocarpos* (Walt.).

Below is given a key and a short summary of the species occurring within the Manual range. Plate 494 shows, in particular, buds, corolla-lobes and pollinia (figs. including retinaculum, caudicles and pollinia). It has been suggested that the more dependable characters are to be found in the pollinia [in the broader sense used to include the retinaculum (the body to which the pollen masses are attached), the caudicles (arms between the pollen masses and the retinaculum) and the pollinia (strictly speaking, the pollen masses)] than in the over-emphasized characters of the corona. From the plate it will be seen that the characters of the pollinia are perhaps [more] useful in separating groups of species rather than single species. Much broader study would be essential to any further statement on these characters.

KEY TO SPECIES OF GONOLOBUS WITHIN THE MANUAL RANGE

a. Follicles costate-angled, not muricate: calyx glabrous or slightly pubescent toward the apex of the lobes: crown low, 10-lobed, at base of anther-column: pollinia slenderly obovoid, attached to the retinaculum by caudicles at least 0.2 mm. long; anther-sacs inconspicuous, with narrow slits.
Flower-buds short-conical, abruptly acuminate: calyx practically glabrous: corolla-lobes broadly lanceolate, usually pubescent (becoming glabrate) within, 5–7 mm. long, about twice the length of the calyx-lobes.....1. *G. suberosus.*
Flower-buds conical, gradually acute or acuminate: calyx glabrous or the lobes ciliolate towards the apex: corolla-lobes linear-lanceolate, glabrous within, three or four times the length of the calyx-lobes.....2. *G. gonocarpos.*

a. Follicles muricate, not costate-angled: calyx pubescent: crown cup-shaped, as high as the anther-column or higher: pollinia semi-lunate or oblong, attached to the retinaculum by caudicles less than 0.2 mm. long; anther-sacs obvious with fairly open slits....*b.*

b. Flower-buds bluntly ovoid, corolla rotate.....3. *G. carolinensis.*

b. Flower-buds oblong-conical, corolla ascending....*c.*

c. Crown of fairly thin texture, the long bifid lobes overtopping the anther-column.
Corolla white or whitish, lobes 8–12 mm. long, 1.5–2.5 mm. broad, imbricate but only slightly contorted in the bud: longer teeth of crown-lobes usually subulate
4. *G. Baldwynianus.*
Corolla brownish-purple, lobes 10–15 mm. long, 3–6 mm. wide, strongly contorted in the bud: longer teeth of crown-lobes flat.....5. *G. decipiens.*

c. Crown fleshy, as long as or slightly longer than the anther-column.
Corolla-lobes broadly linear, 13–15 mm. long, 2–2.5 mm. wide, dark purple.....6. *G. Shortii.*
Corolla-lobes slenderly linear, 9–12 mm. long, 1.5–2 mm. wide, greenish-fuscous outside, purplish within
7. *G. obliquus.*

1. GONOLOBUS SUBEROSUS (L.) R. Br. in Ait. Hort. Kew. ed. 2, ii. 82 (1811); Schultes, Syst. Veg. vi. 59 (1820); Gray, Proc. Amer. Acad. xii. 75 (1877), Syn. Fl. ed. 1 and ed. 2, ii[1]. 103 (1878 and 1886). *Cynanchum suberosum* L. Sp. Pl. 212 (1753). *Vincetoxicum gonocarpos* Walt. Fl. Carol. 104 (1788), in part (fide A. Gray). *V. suberosum* (L.) Britton, Mem. Torr. Bot. Club, vi. 266 (1894).

According to various manuals this species ranges from Virginia to Florida, along and near the coast. I have seen no collections from north of North Carolina.

2. G. **gonocarpos** (Walt.) comb. nov. *Vincetoxicum gonocarpos* Walt. Fl. Carol. 104 (1788), in part (fide A. Gray). *Gonolobus macrophyllus* Michx. Fl. Bor.-Am. i. 119 (1803). *G. laevis* var. *macrophyllus* Gray, Proc. Amer. Acad. xii. 76 (1877), Syn. Fl. ed. 1 and ed. 2, ii[1]. 103 (1878 and 1886). *G. laevis* Michx. l. c.; Gray, op. cit. p. 75 and p. 103.

Virginia and South Carolina south to Alabama and southwest to Arkansas and Texas. The following collections have been seen. VIRGINIA: sandy wooded bottomland of Nottoway River, Courtland, *Fernald & Long 6672;* rich dry woods, Little Neck, *Fernald & Long 5004;* Powhatan Swamp, ½ mile southwest of Five Forks, *L. F. & F. R. Randolph 398.* NORTH CAROLINA: 5 miles southwest of Durham, *Wiegand & Manning 2628.* SOUTH CAROLINA: without definite locality, *Mellichamp.* INDIANA: 1 mile east of the mouth of White River, *Deam 32969;* in low woods north of Eggwood Pond about 5 miles northwest of Patoka, *Deam 16925;* ¾ mile southeast of Yankeetown, *Deam 37583.* KENTUCKY: without definite locality, *Short.* TENNESSEE: Cedar Barrens of Middle Tennessee, *Gattinger;* near Nashville, *Gattinger* (Curtis, N. Amer. Pl. 188); Knoxville, *Ruth 175* in part. ALABAMA, Gadsden, *Vasey.* ARKANSAS: without definite locality, *ex hb. Thurber.* LOUISIANA: without definite locality, *Hale;* near Alexandria, *C. R. Ball 529.* TEXAS: Dallas, *Reverchon;* Houston, *Lindheimer.*

Although Walter's description might be applied to more than one species of *Gonolobus,* I am accepting the interpretation of Dr. Gray and others as to its identity, *i. e.* that it, at least in part, is identical with Michaux's *G. macrophyllus,* hence I have taken up the earlier specific epithet. With the more abundant collections at hand Gray's characters distinguishing *G. laevis* Michx. from var. *macrophyllus* Gray show a high degree of variability, hence, I am inclined to regard them as a single entity.

3. G. CAROLINENSIS (Jacq.) Schultes, Syst. Veg. vi. 62 (1820); Gray, Proc. Amer. Acad. xii. 76 (1877), Syn. Fl. ed. 1 and ed. 2, 104 (1878 and 1886). *Cynanchum carolinense* Jacq. Coll. ii. 288 (1788), Ic. Pl. Rar. ii. t. 342 (1788). *Vincetoxicum acanthocarpos* Walt. Fl. Carol. 104 (1788). *Gonolobus hirsutus* Michx. Fl. Bor.-Am. i. 119 (1803). *Vincetoxicum carolinense* (Jacq.) Britton, Mem. Torr. Bot. Club, v. 265 (1894). *Odontostephana carolinensis* (Jacq.) Alexander in Small, Man. 1077 (1933).

Delaware south to Georgia (and possibly Florida), west to Tennessee and Alabama. DELAWARE: Middletown, August 16, 1908, *Bartram;* Dover, *Tatnall 1467.* MARYLAND, Middle Neck Road, *Tatnall 2814;* Melwood, *C. P. Smith 3181;* Clinton, *C. P. Smith 3180.* DISTRICT OF COLUMBIA: near Washington, *Holm, Vasey, Chickering, Ward;* Anacostia, *C. P. Smith 3066.* VIRGINIA, dry sandy hickory and oak woods, Burt, *Fernald & Long 3657;* north of Moore's Mill, *Fernald & Long 3656;* northern end of Knott's Island, *Fernald & Long 4145;* rich dry woods, Little Neck, *Fernald & Long 5003;* Great Neck, *Fernald, Griscom & Long 4693, 5002;* Grove, *L. F. & F. R. Randolph 361;* near Williamsburg, *Grimes 3666, 3690;* near Cedar Creek, Frederic County,

Griscom & Hunnewell 15244. North Carolina: 8 miles north of Chapel Hill, *Wiegand & Manning 2630;* near Statesville, *Gray, Sargent, Redfield & Canby;* Tryon, *Churchill.* South Carolina, Santee Canal, *Ravenel.* Georgia, without definite locality, *Biltmore Herbarium 3923b;* near Athens, *Perry 1001.* Tennessee: slope of Cumberland Plateau, west of Bon Air, *C. A. & U. F. Weatherby.* Alabama: without definite locality, *Short.*

I am unable to say whether Jacquin's or Walter's is the earlier specific name. Walter's name seems to have been lost in synonymy and I have accepted the name customarily used. Dr. Gray believed Walter's species and *G. carolinensis* to be identical. Miss Vail found the latter and *G. hirsutus* Michx. were "entirely impossible" to separate with the material which she had at hand. I am inclined to agree with Alexander who accepted *G. hirsutus* and *G. carolinensis* as synonymous but nevertheless separated another entity passing under *Vincetoxicum carolinense*. A glance at plate 494, figs. 3, 5, and 4, 6, shows the difference in the flower-buds, the spread of the corolla, and the retinacula.

4. G. Baldwynianus Sweet, Hort. Brit. ed. 2, 360 (1830); Gray, Proc. Amer. Acad. xii. 77 (1877) (as *Baldwinianus*), Syn. Fl. ed. 1 and ed. 2, ii[1]. 104 (1878 and 1886). *Vincetoxicum Baldwinianum* (Sweet) Britton, Mem. Torr. Bot. Club, v. 265 (1894). *Odontostephana Baldwiniana* (Sweet) Alexander in Small, Man. 1077 (1933).

Georgia and Alabama west to Missouri and Oklahoma. The following specimens have been examined. Alabama: dry woods, *Buckley 10.* Missouri: Swan, *Bush 239;* Noel, *Bush 5745;* Cedar Gap, *Lansing 3077;* Eagle Rock, *Bush 230;* near Eagle Rock, along Missouri-Arkansas state line, *Palmer 39460.* Arkansas: Beaver, *Palmer 39473;* Washington County, June 1835, *Engelmann.* Oklahoma: near Page, *Blakeley 1422;* near Idabel, *Houghton 3946.*

This species is readily recognized by the whitish corolla, the subulate lobes of the crown and the very slender retinacula.

5. G. **decipiens** (Alexander) comb. nov. *Odontostephana decipiens* Alexander in Small, Man. 1077 (1933).

This species of "woods and stream-banks, in rather acid soil, Coastal Plain and occasionally adj. provinces, S. C. to Okla., Mo., and Md." according to Alexander, is represented in our herbarium only from Missouri, Arkansas and Louisiana. Missouri: St. Louis County, May 31, 1887, *Eggert;* Allenton, June, 1880, *Letterman;* Meramec Highlands, June 25, 1904, *Gleason;* near Pacific, *Greenman 3899,* June 3, 1918, *Churchill;* Pleasant Grove, *Bush 362;* Prosperity, *Bush 2147;* Oronogo, *Palmer 36033.* Arkansas, Camden, June 15, 1850, *Fendler.* Louisiana: without definite locality, *Hale.*

The best characters of this species are the oblong-conical flower-bud with corolla-lobes strongly contorted, the ascending corolla and the comparatively longer flat teeth of the crown-lobes. In contrast the flower-buds of *G. carolinense* (from which species this has been segregated) are bluntly ovoid, the corolla of the mature flower is rotate (not ascending), the crown-lobes are somewhat variable, but the pollinia are slightly smaller and the retinacula much smaller than in *G. decipiens*.

6. G. SHORTII Gray, Bot. Gaz. viii. 191 (1883). *G. obliquus* var. *Shortii* Gray, Syn. Fl. ed. 1, ii[1]. 104 (1878). *Vincetoxicum Shortii* (Gray) Britton, Mem. Torr. Bot. Club, v. 266 (1894). *Odontostephana Shortii* (Gray) Alexander in Small, Man. 1077 (1933).

Range given by Alexander as Georgia to Kentucky and Pennsylvania. Unfortunately in the Gray Herbarium this species is represented only by the two collections cited by Dr. Gray. KENTUCKY, Lexington, *Short*. GEORGIA, near Rome, 1882, *Chapman*.

7. G. OBLIQUUS (Jacq.) Schultes, Syst. Veg. vi. 64 (1820); Gray, Proc. Amer. Acad. xii. 76 (1877), Syn. Fl. ed. 1 and ed. 2, ii[1]. 104 (1878 and 1886). *Cynanchum obliquum* Jacq. Coll. i. 148 (1786), Ic. Pl. Rar. ii. t. 341 (1786–93). *Vincetoxicum obliquum* (Jacq.) Britton, Mem. Torr. Bot. Club, v. 266 (1894). *Odontostephana obliqua* (Jacq.) Alexander in Small, Man. 1077 (1933).

Pennsylvania south to Georgia west to Ohio, Indiana, Tennessee and Missouri. PENNSYLVANIA, without definite locality, 1862, *C. E. Smith;* river-banks in Lancaster and Franklin Counties, *Porter;* banks of Susquehanna, Lancaster County, *Porter*. MARYLAND: Bloomington, *J. D. Smith*. DISTRICT OF COLUMBIA: near Washington, *Ward, Holm*. VIRGINIA: near Middletown, *Griscom and Hunnewell 18815;* Peaks of Otter, Bedford County, July 29, 1871, *Curtiss*. NORTH CAROLINA, Hot Springs, Madison County, June 7, 1899, *Churchill;* near Alexander, Buncombe County, *Biltmore Herbarium 3928*. GEORGIA, near Rome, 1882, *Chapman*. INDIANA, along White River, 2 miles above Shoals, *Deam 17181*. TENNESSEE: Knoxville, June and July, 1895, *Ruth*.

Readily distinguished by its many-flowered and very often compound umbels and the linear-ligulate lobes of the corolla.

II. ON HOUTTUYN'S OVERLOOKED BINOMIALS FOR NATIVE OR INTRODUCED PLANTS IN EASTERN NORTH AMERICA

E. D. Merrill

(Plate 495)

Houttuyn's[1] "Naturlyke historie," written in Dutch, was frankly an attempt to popularize the binomial system. Christmann and Panzer's[2] "Pflanzensystem," published in German, was to a large degree, although not entirely, a translation of Houttuyn's earlier work, and was illustrated by the same plates, with the interpolation of a few new ones.

Although Houttuyn was the author of over 8800 pages of botanical matter, his work is merely listed in Pritzel's "Thesaurus" under Linnaeus' "Systema naturae," item 5404, as a Dutch edition of Linnaeus' work, without mention of its author's name. What Houttuyn did was to expand the approximately 2350 pages of edition 12 of the "Systema naturae" into 37 volumes containing about 22,000 pages, largely original work, illustrated by 296 distinctly good copper plates. The second part, 14 volumes, somewhat over 8800 pages, with 105 plates, is wholly botanical. Christmann and Panzer fare scarcely better at Pritzel's hands, although their names are mentioned as the authors of the German edition of Linnaeus' "Systema plantarum," item 5431 "nach Anleitung des holländischen *Houttuyn*'schen Werkes übersetzt." This is the only place I have noted in Pritzel's "Thesaurus" where Houttuyn's name is mentioned in connection with this work. This statement applies to the second edition of the "Thesaurus" (1872–77). In the first edition (1751) the entry appears under Houttuyn (item 4730), although in this edition the Cristmann and Panzer entry is under Linnaeus' "Systema naturae". One curious phase of the situation is that in the entire 37 volumes of

[1] Houttuyn, M. Naturlyke historie of uitvorige beschryving der dieren, planten en mineraalen, volgens het samenstel van den heer Linnaeus. Met naauwkeurige afbeeldingen. Eerste deels i. (1761)—xviii. (1773); Tweede deels i. (1773)—xiv. (1783); Derde deels i. (1781)—v. (1785). The 18 volumes of the "Eerste deels" consider the animals, the 14 volumes of the "Tweede deels" the plants, and the 5 volumes of the "Derde deels" the minerals.

[2] Christmann, D. and Panzer, G. W. F. Des Ritters Carl von Linné Königlichen Schwedischen Leibarztes &c. vollständiges Pflanzensystem nach der dreyzehnten lateinischen Ausgabe und nach Anleitung des holländischen Houttuynischen Werks übersetzt und mit einer ausführlichen Erklärung ausgefertiget. i. (1777)—xiv. (1788). The first seven volumes are by Christmann, the last seven by Panzer; see xiii. pt. ii. Vorbericht [2]. (1787).

Houttuyn's work his name does not appear on the title page of a single volume, and I have detected it in only six places where it is appended to introductory matter. As to Christmann and Panzer there is no evidence of authorship of their 14 volume work until the second part of volume 13 appeared in 1787, ten years after publication commenced. In the preface, which is signed by Panzer, is a statement that Christmann was the author of the first seven volumes and that Panzer was the author of the last seven. Manifestly the several authors involved were not seeking for publication credit!

While some of Houttuyn's new species were accepted by his contemporaries and immediate successors, it has become increasingly evident that a very considerable number of his new names have been entirely overlooked, and the same statement applies to the fewer new names published by Christmann and Panzer. Two or three generic names and at least 100 binomials, validly published by these authors between the years 1773 and 1788, do not appear in any indices or nomenclators that have been issued since the works under discussion were published.

In spite of the relatively early dates of these extensive, well illustrated, but now little known and less consulted works, few changes in accepted nomenclature are involved. Most of them appertain to species of Asia and Malaysia, and particularly to those of South Africa. In collating the two works and in checking the binomials with those used in standard works of a similar nature, I have noted four cases where the currently accepted binomials for two native and two introduced species in the eastern United States must be replaced by earlier, and for the most part overlooked, binomials. For another introduced species, *Polygonum cuspidatum* Sieb. & Zucc., for those who prefer to recognize smaller generic units, attention is called to the factthat *Reynoutria* Houtt. (1777) replaces *Pleuropterus* Turcz. (1848). The task of collating the two works was not a simple one, for Houttuyn did not consistently indicate his new genera and new species as such; and Christmann and Panzer, who published various new names, did not indicate such names as new.

It seems desirable to publish the following notes on the American species for the benefit of those botanists interested in problems of nomenclature appertaining to eastern North American plants. No new binomials are involved, but merely replacements of four currently accepted names by earlier ones. There are a few other overlooked

binomials for American species in the two works under discussion, but in no case do they affect nomenclature, all of them falling as synonyms of previously described species. Among these are the following: *Anagallis flava* Houtt. Nat. Hist. II. vii. 514 (1777) = *Lysimachia quadrifolia* Linn.; *Cardamine virginiana* Panzer, Pflanzensyst. viii. 282 (1782) = *Arabis virginica* (Linn.) Trelease; *Eriophorum virginianum* Houtt. Nat. Hist. II. xiii. 127 (1782) = *E. virginicum* Linn.; *Helianthus dodecapetalus* Panzer, Pflanzensyst. ix. 557 (1783) = *H. decapetalus* Linn.; *Helleborus trifoliatus* Houtt. Nat. Hist. II. ix. 262 (1778) = *Coptis trifolia* (Linn.) Salisb.; *Medeola virginiana* Houtt. Nat. Hist. II. viii. 416 (1777) = *M. virginica* Linn.; *Osmunda virginica* Panzer, Pflanzensyst. xiii. pt. i, 57 (1786) = *Botrychium virginianum* (Linn.) Sw.; and *Panax trifoliatum* Panzer, Pflanzensyst. x. 335 (1783) = *Panax trifolium* Linn. It is planned to publish a general consideration of all the new binomials published by Houttuyn and by Christmann and Panzer at a later date.

Polygonaceae

Polygonum cuspidatum Sieb. & Zucc. Abh. Akad. Muench. iv. pt. ii, 208 (1846) (Fl. Jap. Fam. Nat. ii. 84); Nakai, Fl. Korea. ii. 173 (1911). *Reynoutria japonica* Houtt. Nat. Hist. II. viii. 640, *t. 51, f. 1* (1777); Christm. Pflanzensyst. vi. 628, *t. 51, f. 1* (1780); Ohki, Bot. Mag. Tokyo xl. 49 (1926); Danser, Bull. Jard. Bot. Buitenz. sér. III. viii. 26 (1926), non *Polygonum japonicum* Meisn. *Polygonum pictum* Sieb. Jaarb. Nederl. Maatsch. Aaanm. Tuinb. 44 (1848), *nomen nudum*. *Polygonum Sieboldii* Reinw. ex De Vriese, op. cit. 31. 1850, *in syn.*; L. H. Bailey, Cycl. Am. Hort. iii. 1393. *f. 1880* (1901). *Polygonum Zuccarinii* Small, Mem. Dept. Bot. Columbia Univ. i. 158. *t. 66* (1895). *Polygonum Reynoutria* Makino, Bot. Mag. Tokyo xv. 84 (1901), Somuku-Dzusetsu, ed. 3, i. 75. *t. 75* (1910). *Pleuropterus Zuccarinii* Small in Britt. & Br. Ill. Fl. North. U. S. ed. 2, i. 676, *f. 1655* (1913). *Pleuropterus cuspidatus* H. Gross in Loesen. Beih. Bot. Centralbl. xxxvii. pt. ii, 114 (1919). *Pleuropterus cuspidatus* Moldenke, Torreya xxxiv. 7. 1933.

This was described by Houttuyn as the type of a new genus, *Reynoutria*, listed in "Index Kewensis" as a genus of uncertain status, but not included in Bentham and Hooker's "Genera Plantarum" nor in Engler and Prantl's "Die Natürlichen Pflanzenfamilien." Nevertheless, if one wishes to recognize generic segregates in this group, *Reynoutria* Houtt. (1777) will replace *Pleuropterus* Turcz. (1848). In 1901 Makino recognized *Reynoutria japonica* Houtt. as being identical with the very common *Polygonum cuspidatum* Sieb. & Zucc., and

in 1926 Danser reproduced Houttuyn's original description and illustration. Since 1895 the species has acquired at least four bibliographic synonyms, although under the present rules Siebold and Zuccarini's specific name is valid in *Polygonum*. The "earlier" *P. cuspidatum* Willd. appears only in synonymy, and is hence not valid. These synonyms are *Polygonum Zuccarinii* Small (1895), *Polygonum Reynoutria* Makino (1901), *Pleuropterus Zuccarinii* Small (1913), *Pleuropterus cuspidatus* H. Gross (1919), and *Pleuropterus cuspidatus* Moldenke (1933). For those who recognize small genera in this group the binomial should be *Reynoutria japonica* Houtt. Should *Pleuropterus* Turcz. (1848) be ultimately conserved over *Reynoutria* Houtt., for which no valid reason exists, then a new combination based on *Reynoutria japonica* Houtt. will be necessary. Those who recognize *Polygonum*, *sensu latiore*, should use the binomial *P. cuspidatum* Sieb. & Zucc. For notes on the validity of the latter name, under *Polygonum*, see Moldenke, l. c., and Rehder, Jour. Arnold Arb. xvii. 316 (1936). The species is a very common and widely distributed one in eastern Asia and in Japan, and is naturalized in various parts of the eastern United States.

Umbelliferae

Torilis japonicus (Houtt.) DC. Prodr. iv. 219 (1830); Buwalda, Blumea ii. 169 (1937). *Caucalis japonicus* Houtt. Nat. Hist. II. viii. 42, *t. 45, f. 1* (1777); Christm. Pflanzensyst. vi. 45, *t. 45, f. 1* (1780). *Tordylium Anthriscus* Linn. Sp. Pl. 240 (1753). *Caucalis Anthriscus* Huds. Fl. Angl. 99 (1762), ed. 2, 114 (1778), Britt. & Br. Ill. Fl. North. U. S. ii. 54, *f. 2634* (1897). *Torilis Anthriscus* Gmel. Fl. Bad. i. 613 (1805); Britt. & Br. Ill. Fl. North. U. S., ed. 2, **2**: 626, *f. 3106* (1913); Thellung in Hegi, Ill. Fl. Mittel-Eur. v. pt. ii. 1051. 1926, non Gaertn. (1788), nec Bernh. (1800).

Linnaeus described two similar but distinct species with the same specific name, *Tordylium Anthriscus* and *Scandix Anthriscus*. The *Tordylium* is the species here considered but the specific name is invalidated in *Torilis* by both Gaertner's and Bernhardt's use of the same epithet for a different species based on *Scandix Anthriscus*. *Scandix Anthriscus* Linn. has nothing to do with the species here considered, and is *Chaerefolium Anthriscus* (Linn.) Schinz & Thellung (*Torilis Anthriscus* Gaertn.; Bernh.). Under the International Code Houttuyn's specific name is the correct one for this very common and widely distributed Eurasian weed which occurs as an introduced and naturalized species in various parts of North America. There is a

specimen in the Delessert herbarium at Geneva, Switzerland, accredited in literature to Houttuyn; it may prove to be a Royen specimen, *i. e.* one from Royen's herbarium and named by him rather than by Houttuyn.

Labiatae

Trichostema setaceum Houtt. Nat. Hist. II. ix. 428 (1778). *Trichostema lineare* Walt. Fl. Carol. 164 (1788). *Trichostema lineare* Nutt. Gen. ii. 39 (1818); Britt. & Br. Ill. Fl. North. U. S. iii. 78, *f. 3074* (1898), ed. 2, iii. 105, *f. 3574* (1913). *Trichostema foliis setaceis* Gronov. Fl. Virgin. ed. 2, 90 (1762).

Houttuyn's hitherto overlooked binomial was based wholly on the Gronovius reference, which in turn was based on *Clayton 41* from Virginia. Mr. J. E. Dandy of the British Museum (Natural History) kindly examined Clayton's specimen at my request. He reports that the rather fragmentary material, of which a photograph was courteously supplied to me by Dr. J. Ramsbottom, was determined by Mr. C. A. Weatherby in 1935 to represent *Trichostema lineare* Nutt. Professor Fernald calls my attention to the fact that *Trichostema lineare* Nutt. was originally and correctly published by Walter as *T. lineare* Walt. thirty years before Nuttall independently described the same species under the same specific name. Houttuyn did not indicate his binomial as a new one, yet it antedates *T. lineare* Walt. by ten years. Christmann and Panzer did not recognize the species. *Trichostema setaceum* Houtt. occurs in dry sandy soil, pine barrens, etc. from Connecticut to Georgia and Alabama, mostly near the coast.

Scrophulariaceae

Pedicularis labradorica Wirsing, Ecolog. Bot. [2] *t. 10* (1778); Panzer, Pflanzensyst. viii. 39, *t. 57c* (1782); Fernald, Rhodora xxxiii. 193 (1931). *Pedicularis euphrasioides* Stephan in Willd. Sp. Pl. iii. 204 (1801); Britt. & Br. Ill. Fl. North. U. S. iii. 185, *f. 3332* (1898), ed. 2, iii. 220, *f. 3847* (1913). Plate 495.

This species was not included by Houttuyn in his treatment of *Pedicularis*, Nat. Hist. II. ix. 468–478 (1778). The "Index Kewensis" reference "[Panzer, in] Houtt. Pflanzensyst. viii. 39 = *euphrasioides.*" is erroneous and incomplete. Fernald, in calling attention to the older name for *Pedicularis euphrasioides* Stephan, gives the reference as "Houttuyn, Pflanzensyst." This error in citation originated with Willdenow who gives it as "Houttuyn Lin. Pfl. Syst. 8. p. 39. *t. 57c.*" Panzer, in his translation of Houttuyn's work, added a description of this species, and interpolated two extra plates which he numbered

57b and 57c; the second of these is an excellent illustration of the species under consideration (see PL. 495), copied from "Ecl. bot." which he cites without giving the author of the work. This proves to be Wirsing's "Eclogicae botanicae" (1778), as verified by an examination of this work first by Mr. J. E. Dandy in the library of the British Museum, Natural History, and checked by me in the library of the New York Botanical Garden. Wirsing's hitherto overlooked description of *Pedicularis labradorica* is as follows:

"Caule ramoso, calycibus ore obliquo integro emarginato. Addimus hanc plantam, antea neque descriptam neque depictam, sed plane novam, quam e Labradoria accepimus. Color corollae flavus est. Accedit ad *Pedicularem caule ramoso, calycibus oblongis quinquefidis crenatis, floribus laxe spicatis.* Gmelin, *Fl. sibir. tom. 4. p. 203. t. 43.* sed pluribus notis ab ea differt."

This is the only species that Wirsing characterized as new in the work cited. It has been overlooked by all subsequent authors, or erroneously accredited to Houttuyn, who never considered the species. It occurs from Greenland and Labrador, through arctic America to British Columbia and Alaska, and also in northern Asia.

COMPOSITAE

EUPATORIUM RUGOSUM Houtt. Nat. Hist. II. x. 558 (1779). *Ageratum altissimum* Linn. Sp. Pl. 839 (1753), ed. 2, 1176 (1763). *Eupatorium urticaefolium* Reichard, Syst. Pl. iii. 719 (1780); Panzer, Pflanzensyst. ix. 245 (1783); Britt. & Br. Ill. Fl. North. U. S. ed. 2, iii. 361, *f. 4169* (1913). *Eupatorium ageratoides* Linn. f. Suppl. 355 (1781); Britt. & Br. Ill. Fl. North. U. S. iii. 312, *f. 3629* (1898). *Eupatorium altissimum* Murr. Syst. Veg. ed. 13, 614 (1774), non *E. altissimum* Linn. (1753).

Eupatorium rugosum Houtt. is a validly published new name based on *Ageratum altissimum* Linn.; it was not indicated by Houttuyn as new. The Linnaean binomial and the pre-Linnaean synonyms of Gronovius and Cornut are cited in the footnote. *Eupatorium ageratoides* Linn. f. (1781) was based on *Eupatorium altissimum* Murr. (1774), which in turn was based on *Ageratum altissimum* Linn. *Eupatorium urticaefolium* Reichard (1780) was also proposed as a new name for the same Linnaean species. Houttuyn in 1779, Reichard in 1780, and Linnaeus f. in 1781 all proposed new names, one year apart, for *Eupatorium altissimum* (Linn.) Murr., which was invalidated by the earlier *E. altissimum* Linn. (1753). The species occurs from Quebec westward to Nebraska and southward to Louisiana and Florida. *Eupatorium rugosum* HBK., an Ecuadorian species, needs a new name.

III. SMELOWSKIA AND POLYCTENIUM

Reed C. Rollins[1]

(Plate 496)

To students of the *Cruciferae* the accurate definition of genera is an acute problem. This is understandable when the uniformity of flower- and fruit-morphology is considered together with the apparent youth of the family. While this "naturalness" has become an enigma to those chiefly interested in developing a suitable classification, the same characteristic presents a fertile field of investigation for the phylogenist, since the differences between genera are sometimes relatively small and it is often possible to trace evolutionary trends within the family with considerable facility. However, an adequate and accurate system of nomenclature based upon all the available evidence must be built up before finality in a phylogenetic scheme for the family can be developed. Accordingly a program of research is under way which is designed to clarify the generic relationships of certain groups in the *Cruciferae* which occur in North America.

In addition to the usual methods in systematic botany a certain amount of micro-technique has been employed in the present study. Serial sections of flowers and fruits of *Smelowskia* and *Polyctenium* have been prepared for detailed examination. Since fresh material was not available, flowers and fruits from herbarium material were swelled to normal by leaving them over-night in a 5% solution of KOH. The tissues of the material were then softened by a 12-hour treatment with a ten percent solution of hydrofluoric acid. From this point the ordinary paraffin method of embedding and sectioning was employed. The sections were stained with safranin and fast green.

Probably the most useful and significant microscopical observations in a study of this nature are those which accurately establish the relative position of parts and organs. Thus it has been possible to show (Plate 496, fig. 14) that the long stamens in the flower of *Smelowskia* are proximal to the transverse long axis of the ovary, whereas the lateral short stamens are proximal to a line running across the short axis. In *Polyctenium* (Plate 496, fig. 2) the compression of the normal mature silique is the opposite. The long stamens are proximal to a median transverse line through the short axis of the silique and the short stamens are near a transverse line passed through

[1] The Society of Fellows of Harvard University.

the long axis. Thus the compression of the silique is contrary to the septum in *Polyctenium* and parallel to it in *Smelowskia*. Serial sections of young and old flowers show these differences to be constant for the two genera, and, although it might be argued that a change from one type of orientation to the other is relatively simple, yet such an accomplished change is highly important when considered together with correlated changes which accompany it. *Smelowskia* and *Polyctenium* are clearly related genera, though there is little evidence to indicate that their entire history has been similar. *Smelowskia* is essentially an arctic-alpine genus with two areas of concentration, the Cascade and Rocky Mountains of western North America and the Altai and adjacent ranges of Siberia and the Turkestans. The genus extends as far south as Mt. Lassen in the Sierra Nevada of California and to southern Colorado in the Rocky Mountains. *Polyctenium*, on the other hand, inhabits a unified semiarid area at relatively low elevations in northeastern California, southern and eastern Oregon and western Idaho. Further evidence of the distinctness of these two genera may be found in the number of ovules, length of funiculus, size of seed, petal-shape, type of foliage and general habit of growth. The leaves of *Smelowskia* are petiolate, pliable and usually covered with a dense whitish tomentum; the plants are caespitose, with the caudices covered by leaf bases; the petals differentiated into claw and rounded blade; the funiculus short (less than 1 mm.) and stubby; the ovules 2–10, maturing to relatively large seeds (2 mm. long). *Polyctenium*, on the other hand, has non-petiolate, highly dissected, wiry leaves with linear segments; sparse, never whitish, pubescence; caudices free of leaf-bases; and truncate petals which taper from apex to base. A weak funiculus 1 mm. long attaches the small (1 mm. long) seed to the replum and 12–28 ovules are present in the silique.

In 1875 Watson[1] described a plant from southern Oregon as *Smelowskia ? Fremontii*. Appended to the description he says "it much resembles *S. calycina* in habit, but the characters of the fruit do not fully accord with those of the genus." It is significant, in light of subsequent treatments and as confirmatory evidence for the present study, that he considered the plants to be somewhat anomolous in *Smelowskia*. Though Robinson (Syn. Fl.) admitted this species to *Smelowskia* without qualification, Greene,[2] upon encountering the

[1] Watson, Proc. Am. Acad. Arts & Sci. ii. 123 (1875).
[2] Greene, Erythea iii. 69 (1895).

same biological unit, described it as a new species of *Braya* to which genus it is not particularly related. He later recognized his own plants to be conspecific with those of Watson, but refused even then to admit them to the genus *Smelowskia*. In describing *Polyctenium* as a new genus, Greene[1] said in part, "to the eye of experience there is not a suggestion here of the genus *Smelowskia*, which are not only soft-wooly herbs, but their herbage is soft as to texture, that is, it is yielding or pliable, whereas in *Polyctenium* it is in every part rigid, wiry as to the stems and as to the leaves stiffly acerose." Thus with a strong emphasis on habital and vegetative characteristics but without a thorough examination of the morphology of flower and fruit, the genus *Polyctenium* was created; at the same time two new species were described and attributed to it. The superficiality of Greene's observations does not alter the fact that he was correct in separating these two genera. Subsequent treatments of *Smelowskia* have included *Polyctenium* as a synonym, though O. E. Schulz[2] gave it the rank of a section. In view of this lack of uniformity of treatment and clear elucidation of the facts involved, the objects of the present study were: (1) to determine the facts of floral morphology, (2) to use these criteria to establish the two units as a single genus or as two genera, as the facts dictated, and (3) to present a systematic treatment of this group for North America.

It is a pleasure to acknowledge my indebtedness to Professor M. L. Fernald, Director, and other members of the staff of the Gray Herbarium, where facilities for study have been made readily available and constantly at my disposal. That portion of the work which involved micro-technique was done in the laboratory of Professor R. H. Wetmore. An expression of appreciation is made to the curators of the following herbaria, who have generously loaned specimens or allowed me the privilege of examining material in their care: University of California (C); Missouri Botanical Garden (M); University of Notre Dame (ND); New York Botanical Garden (NY); Rocky Mountain Herbarium (RM); United States National Herbarium (US); University of Washington (UW). Specimens cited (G) or not otherwise designated are in the Gray Herbarium of Harvard University. Collections from my own herbarium are designated (R).

[1] Greene, Leafl. ii. 219 (1912).
[2] O. E. Schulz in Engler, Pflanzenr. iv[105]. 358 (1924).

Synopsis of Smelowskia in North America

a. Mature fruits oblong, tapering at both ends, 5–12 mm. long; seeds 4–10; basal leaf-bases strongly ciliate with long acicular hairs; lobes of basal leaves oblong or cuneate, rarely dissected to mid-rib; stems simple. . . . . *S. calycina* & vars.
  b. Cauline leaves entire or trilobate at apex; basal leaves entire or remotely toothed, less than 2.5 cm. long; inflorescence lax-corymbose; plants of Alaska and Siberia adjacent to the Bering Strait. . . . . var. *integrifolia.*
  b. Cauline leaves pinnatifid; basal leaves pinnately dissected or tending to become entire, more than 2.5 cm. long; inflorescence congested-corymbose. . . . . var. *typica.*
a. Mature fruits ovate to slightly oblong, truncate at base, 3–6 mm. long; seeds 2–6; basal leaf-bases lacking pronounced ciliation; lobes of basal leaves ovate and dissected to mid-rib, stems often branched. . . . . *S. ovalis* & vars.
  c. Plants densely caespitose, clothed in long simple hairs; fruits 4–6 mm. long; plants of northern California. . . . . var. *congesta.*
  c. Plants less dense; leaf-blades with a short, often branched pubescence; fruits 2–4 mm. long. . . . . var. *typica.*

S. CALYCINA (Stephan) C. A. Meyer. Perennial, caespitose, the multiple caudex clothed with old leaf-bases; stems several to numerous, simple, pubescent with short branched and long simple hairs, 5–15 cm. long; basal leaves numerous, petiolate, pinnately divided or very rarely almost entire, segments oblong to cuneate, densely clothed with a whitish, chiefly branched, pubescence, bases strongly ciliate with long white acicular hairs; cauline leaves similar but nearly sessile, few, the lobes more linear, tending to be reduced upwards on the stem, 1–3 cm. long; pedicels ascending, pubescent with long simple hairs, 5–10 mm. long; sepals pubescent, oblong, 2.5–3.5 mm. long, 1–1.5 mm. wide; petals white, rounded at apex, differentiated into claw and blade, 5–7 mm. long, 3–4 mm. wide; pods linear to oblong, tapering at both ends, glabrous or rarely pubsecent with simple hairs, slightly flattened parallel to septum or nearly terete, 5–12 mm. long, 1.5–2.5 mm. wide, style 1.5 mm. or less, valves nerved from base to apex, stigma expanded; seeds few (4–10), marginless, 2 mm. long, funiculus short and stout, cotyledons incumbent.

Var. **typica.** *S. calycina* C. A. Meyer in Ledeb. Fl. Alt. iii. 170 (1831); Gray, Proc. Acad. Nat. Sci. Phila. no. 43: 58 (1863); Watson, U. S. Geol. Expl. (fortieth parallel) v. 24 (1871); Parry in Hayden, U. S. Geol. Surv. Wyo. 484. (1871); Porter & Coulter, Syn. Fl. Colo. 8 (1874); Macoun, Catal. Canad. Pl. i. pt. 1: 56. 490 (1883); Coulter, Man. Bot. Rky. Mt. Reg. 24 (1885); Tweedy, Fl. Yellowst. Nat. Park 28 (1886); Macoun, Check-List Canad. Pl. 10. (1889); Nelson, Bull. Wyo. Exp. Sta. 28: 83 (1896); Howell, Fl. Northw. Am. i. 57 (1897) in part; Rydb. Mem. N. Y. Bot. Gard. i. 183 (1900); Piper, Contrib. U. S. Nat. Herb. xi. 300 (1906); Brown, Alp. Fl. Canad. Rky. Mts. 121 (1907) t. xxxi; Frye & Rigg, Northw. Fl. 189 (1912); Clements & Clements, Rky. Mt. Flowers, 27 (1914); G. N. Jones, Univ. Wash. Publ. Biol. v. 161 (1936), including *S. ovalis.* *S. calycina* prol.

americana O. E. Schulz in Engler, Pflanzenr. iv[105]. 356. (1924) & Pflanzenf. xviib. 656 (1936). *Lepidium calycinum* Stephan in Willd. Spec. Pl. iii[1]. 433 (1801). *Hutchinsia calycina* Desv. Journ. Bot. iii. 4. 168 (1814); DC. Syst. ii. 388 (1821) & Prodr. i. 178 (1824); Hook. Fl. Bor.-Am. i. 58 (1830) t. xvii. fig. B; T. & G. Fl. North Am. i[1]. 114 (1838); Ledeb. Fl. Ross. i. 200 (1842). *H. calycina* β *americana* Regel & Herder, Bull. Soc. Nat. Mosc. xxxix[2]. 101 (1866) excl. pl. Alaska & Oreg. *S. americana* Rydb. Bull. Torr. Bot. Club xxix. 239 (1902); Blankinship, Mont. Agric. Col. Sci. Studies i. 2. 60 (1905); Rydb. Fl. Colo. 153 (1906); Coulter & Nelson, New Man. Bot. Centr. Rky. Mts. 224 (1909); Rydb. Fl. Rky. Mts. 329 (1917); Henry, Fl. So. Br. Columb. 142 (1918); Standley, Contrib. U. S. Nat. Herb. xxii[5]. 346 (1921); Tidestrom, Contrib. U. S. Nat. Herb. xxv. 239 (1925); Standley, Pl. Glac. Nat. Park, 45 (1927), fig. 58. *S. lineariloba* Rydb. Bull. Torr. Bot. Club, xxxi. 555 (1904) and Fl. Colo. 153 (1906); Cockerell, Am. Nat. xl. n. 480: 865 (1906); Rydb. Fl. Rky. Mts. 329 (1917); Holm, Mem. Nat. Acad. Sci. Wash. xix. 9 (1923); Schulz, l. c. 357 and Das Pflanzenf. xviib. 656 (1936); Graham, Ann. Carneg. Mus. xxvi. 222 (1937). *S. lineariloba* f. *virescens* Schulz l. c. *S. lobata* Rydb. Bull. Torr. Bot. Club xxxix. 327 (1912); Rydb. Fl. Rky. Mts. 329 (1917).—Southern Colorado and Utah to Washington, British Columbia and Alberta and in the Altai region of south-central Siberia. Canada: locality uncertain, Palliser's Brit. N. Am. Exp., Rocky Mts. 1858, *E. Bourgeau* (NY, G, type & isotype of *S. lobata* Rydb.). Alberta: Sheep Mt., July 1895, *Macoun 10315;* Elbow River, June–Jul. 1897, *Macoun 18172;* Crow Nest, lat. 49° 30′, Aug. 1897, *Macoun* (ND); north of Kootenai Pass, July 1883, *Dawson.* British Columbia: Skagit Valley, July 1905, *Macoun 70847;* 40–50 miles sw. of Banff, Jul.–Aug. 1905, *B. P. Clark.* United States: exact locality unknown; Rky. Mts. lat. 49° n. 1861, *Lyall;* sw. Calif. to so. Utah, May–Oct. 1898, *C. A. Purpus* (C). Montana: Upper Marias Pass, Aug. 1883, *Canby 32;* Bald Mt. July 1880, *S. Watson 36;* McDonald's Peak, July 1883, *Canby 32;* Spanish Peaks, July 1901, *J. Vogel;* Glacier Park, Gunsight Mt., Aug. 1919, *Somes 31* (NY); Glacier Park, Baring Basin, July 25, 1933, *McLaughlin 2904* (UW). Wyoming: Saltlick Mt., ne. of Kendall, Aug. 1922, *E. B.* & *L. B. Payson 2952* (G, RM); the Thunderer, Yellowstone Nat. Park, July 1899, *A.* & *E. Nelson 5821* (G, RM); Teton Pass Mts., July 1920, *E. B.* & *L. B. Payson 2095* (G, RM); Wind River Mts., July 1922, *E. B.* & *L. B. Payson 2890* (G, RM); Red Mt. ne. of Smoot, July 1923, *Payson* & *Armstrong 3629* (G, RM); nw. Wyo. 1873, *Parry 17;* Laramie, July 1891, *Nelson 5;* Frozen Lake, Park Co., July 1937, *L. O.* & *R. P. Williams 3584* (R). Colorado: Rky. Mts. lat. 39°–41°, 1862, *Hall* & *Harbour;* near Trout Lake, San Miguel Co., Aug. 1924, *E. B.* & *L. B. Payson 4181* (G, RM); Ethel Peak, Larimer Co., Aug. 1903, *Goodding 1888* (G, RM); Mt. nw. of Como, July 1895, *Crandall* & *Cowan 66;* La Plata Mts., July 1898, *Baker, Earle* & *Tracy 580* (G, isotype of *S. lineariloba* f. *virescens* O. E.

Schulz); Douglass Mt., 1878, *M. E. Jones 447* (NY, type of *S. linariloba* Rydb.); Hamilton Pass, Aug. 1875, *E. L. Greene 671*. IDAHO: Smoky Mts., Blaine Co., Aug. 1916, *Macbride & Payson 2733* (G, RM); south end Soldier Mts., June 1916, *Macbride & Payson 2889* (G, NY, RM); Mt. Hyndman, July 30, 1936, *Thompson 13,631;* Henry Lake, Fremont Co., July 1920, *E. B. & L. B. Payson 1958* (G, RM); Stevens Peak, Aug. 1895, *Leiberg 1480.* UTAH: Ridge nw. Paradise Park, Uinta Basin, July 1933, *Graham 8433;* Big Cottonwood Canyon, Salt Lake Co., June 1905, *Garett 1301;* July 1905, *Rydberg 6821;* American Fork Canyon, July 1885, *Leonard;* Uinta Mts., Aug. 1869, *S. Watson 100;* July 1926, *E. B. & L. B. Payson 4916* (G, RM); La Sal Mts., July 1924, *E. B. & L. B. Payson 3982* (G, RM). NEVADA: East Humboldt Mts., Aug. 1868, *S. Watson 100;* Sept. 1868, *S. Watson 100.* OREGON: Wallowa Mts., Aug. 1886, *Cusick 1347* (C, G). WASHINGTON: Mt. Stuart, Aug. 1883, *T. S. Brandegee 641;* July 1931, *Thompson 7679;* Olympic Mts. Jefferson Co., Aug. 1931, *Thompson 8002;* Mt. Angeles, Clallam Co., July and Aug. 1931, *G. N. Jones 3171* and *3799* (UW); June 1932, *Thompson 8389;* July 1931, *Thompson 7386* and *7394;* Hurricane Ridge, June 1934, *Thompson 10591* (G, UW); Sept. 6, 1937, *Thompson 14,214* (R); Olympic Mts., 1889, *J. M. Grant.*

Ever since Rydberg[1] published *S. americana* after having made the following observation, "while in Europe last summer, I looked up the Asiatic type of *S. calycina* and this differs considerably from ours in the long villous pubescence," many botanists have hesitated to associate the plants of North America specifically with those of Siberia. The fact that the author neither amplified nor elucidated his statement, leaves much to be desired, since anyone familiar with our plants knows that the pubescence of the upper stem, pedicels and sepals is of a "long villous" type. This point, insignificant at the outset, is of no value in separating the plants from the two areas. My studies on this problem have revealed two very minor quantitative differences, both of which are covered by the natural variation in American plants and would likely lose even the slight conspicuousness here recorded, if a larger series of Asiatic specimens were considered. The average length of the style is a fraction of a millimeter longer and the pod averages 1–2 mm. shorter in the Siberian plants than in those from this country. However, on the whole, plants from the two continents are so similar in all important morphological features that they cannot be satisfactorily maintained as even varietally distinct.

Several variations of minor importance, as illustrated by a large series of specimens, may well be noted with profit. Plants from the

[1] Rydberg, Bull. Torr. Bot. Club xxxix. 239 (1902).

Olympic Mountains of Washington and from northern Montana extending northward tend to be whitish from a very dense pubescence. That this is probably a climatological response is indicated by the fact that a gradual reduction in the amount of indument may be observed on specimens from localities proceeding from north to south along the Rocky Mountain axis. Rydberg gave weight to the abundance of vestiture in describing *S. lobata*, while O. E. Schulz described *S. lineariloba* f. *virescens* largely on the basis of a reduced amount of pubescence. Neither of these forms seem to merit nomenclatorial rank, however, since the distinguishing characters attributed to them are either unstable or of very minor significance. The fruits vary in length as does the length of the style. For example, the short pods (5–6 mm.) and styles (less than 1 mm.) found on the type-specimen of *S. lobata* from British North America, are also found on specimens from Wyoming (*Payson & Payson* 2952) and much farther south in Utah (*Payson & Payson* 3982) neither of which exhibit the supposedly distinctive correlated characters. Leaf-shape and degree of lobation are highly variable, lacking correlation with stable features and occurring at various geographical points throughout the range of the species. Thus it seems clear that *S. lineariloba*, founded chiefly on length of pod and leaf-lobation, *S. lineariloba* forma *virescens*, founded on scantiness of pubescence, and *S. lobata*, founded largely on abundance of vestiture, leaf-lobation and length of silique and style, should be included under the variable but understandable *S. calycina*.

Var. **integrifolia** (Seemann), comb. nov. Leaves entire or divided toward apex only, spatulate to somewhat cuneate, petiolate, 1–2.5 cm. long, 2–7 mm. wide; stems 5–12 cm. long; inflorescence lax-corymbose; pedicels 5–10 mm. long, spreading; siliques ellipsoidal, narrowed toward base, glabrous, valves nerved; style less than 1 mm. long; seeds oblong, 2 mm. long, 1 mm. broad, 2–4 in each silique.—*Hutchinsia calycina* var. *integrifolia* Seemann, Bot. Voy. Herald 25 (1852). *H. calycina* var. β, Hook. Fl. Bor.-Am. i. 59 (1830); Hook. & Arnott, Bot. Beechey's Voy. 122 (1832); T. & G. Fl. No. Am. i. 114 (1838). *H. calycina* var. γ, Ledeb. Fl. Ross. i. 201 (1842). *Smelowskia calycina* Robinson in Gray, Syn. Fl. No. Am. i. 136 (1895) in part. *S. calycina* prol. *americana* f. *integrifolia* O. E. Schulz in Engler, Pflanzenr. iv[105]. 356 (1924).—Western coast of Alaska and eastern coast of Siberia (?) adjacent to Bering Strait. Alaska: Port Clarence, July 1899, *Trelease & Saunders 3986* (M); Anvil Peak near Nome, July 1936, *G. N. Jones 9094;* July 8 and Aug. 16, 1900, *Flett 1631* (UW). Siberia: Plover Bay, 1881, *John Muir 228* (G, this fragmentary specimen not certainly determinable as var. *integrifolia* but presumably belonging here).

First described as var. β under *Hutchinsia calycina* by Hooker, this entity, originally collected on Cape Mulgrave by Lay & Collie, has received a variety of unsatisfactory treatments. Torrey & Gray and Ledebour followed Hooker in separating the unit as a variety with entire leaves but failed to give it a name. Seemann, in enumerating his collections from Alaska, designated a plant from Cape Kruzenstern as var. *integrifolia*, citing Hooker's description of var. β and erroneously ascribing the name to him. O. E. Schulz correctly cited Seemann as the author of the name when relegating this unit to the status of a form; but, not having seen specimens, he apparently regarded the characters repeatedly emphasized by earlier workers as of only minor importance. Mature fruiting specimens show characters which well merit the rank of variety for this entity.

S. OVALIS M. E. Jones. Perennial, multiple caudex clothed with dead leaf-bases; stems simple or often branched, densely pubescent with a long simple and short branched pubescence, 5–15 cm. long; basal leaves petiolate, pinnately divided, segments obovate, densely clothed with a whitish chiefly branched pubescence, 2–6 cm. long; cauline similar, few, 1–3 cm. long; inflorescence corymbose, elongating but dense in fruit; pedicels ascending, densely pubescent with long simple hairs, 4–8 mm. long; sepals oblong, scarious-margined, hairy, 3–3.5 mm. long, 1–1.5 mm. wide; petals white, rounded at apex, differentiated into claw and blade, 4–5 mm. long, 2 mm. wide; pod glabrous, ovoid to ovate, 4–6 mm. long, 4 mm. broad, valves faintly nerved at base; style less than 1 mm. long; stigma expanded; seeds few (2–6), oblong but pointed on distal end, marginless, cotyledons incumbent.

Var. **typica.** *S. ovalis* M. E. Jones, Proc. Calif. Acad. Sci. v². 624 (1895); Piper, Mazama ii². 109 (1900); Piper, Contrib. U. S. Nat. Herb. xi. 301 (1906); Frye & Rigg, Northwest Fl. 189 (1912); Piper & Beattie, Fl. Nw. Coast, 174 (1915); Rydb. Fl. Rky. Mts. 329 (1917); Flett, Fl. Mt. Rainier, 47 (1922); O. E. Schulz in Engler, Pflanzenr. iv¹⁰⁵. 357 (1924) and Pflanzenf. xviib. 656 (1936); St. John & Warren, Am. Midl. Nat. xviii. 969 (1937).—Cascade Mountains of Oregon and Washington.[1] OREGON: Three Sisters, 1881, *L. F. Henderson.* WASHINGTON: Mt. Adams, Aug. 12, 1882, *Howell 3846* (US, type; M, NY, isotypes)[2]; Sept. 1877, *Suksdorf;* July 1899, *Flett* (US); Aug. 1892, *L. F. Henderson* (UW); Aug. 1894, *Lloyd* (NY); Mt. Rainier,

[1] *S. ovalis* is cited from the Olympic Mts. by G. N. Jones, Univ. Wash. Publ. Biol. v. 161 (1936). However, I have recently consulted with Dr. Jones and we have concluded that the specimens on which the report was based are immature *S. calycina.*

[2] The only specimen from Mt. Adams collected on Aug. 12, in the U. S. Nat. Herb., is that of Howell. M. E. Jones l. c. gave the year of the type-collection as 1892; however, even though Howell's specimen bears the date 1882, it is selected as the type since there seems to be no other alternative.

Aug. 1897, *Merriam* (US); Aug. 1895, *Piper 2063* (US); Aug. 1934, *Thompson 11,087* (G, M, UW); Aug. 1933, *Thompson 10,000* (G, NY, US, UW); Aug. 1901, *Flett 1999* (NY); Aug. 1892, *Allen 61;* July 1937, *G. N. Jones 10,325;* Indian Head Peak, Chelan Co., July 1921, *St. John 4839* (G, M, NY); Mt. Maude, Chelan Co., Aug. 1933, *Morrill 335* (UW); Mt. Stuart, July 1931, *Thompson 7679* (NY, US); July 1898, *Elmer 1095* (US); 1883, *Brandegee 641* (US); head of Ingals Cr., Aug. 1898, *Whited 838* (US); Wenatche region, Aug. 1883, *Tweedy 865* (US); above Hidden Lakes, Okanogan Co., Aug. 1916, *McDaniels 13,469* (US); Burch Mt., Okanogan Co., June 1934, *Thompson 10,837* (G, NY, UW); Fremont Mt., Pierce Co., July 1934, *Thompson 11,087* (M).

Var. **congesta** var. nov., caespitosa incana pubescenti-tomentosa; siliculis ovatis 4–6 mm. longis; stylo ± 1 mm. longo. Caespitose, pubescent throughout with long simple hairs; inflorescence corymbose, elongating only slightly in fruit; petals white or pinkish; pods ovate, truncate at base, tapering at apex; style ± 1 mm. long.—*S. calycina* Brewer & Watson, Bot. Calif. i. 42 (1876); Greene, Fl. Francis. 252 (1891) as to Calif. Pl. cited; Jepson, Man. Fl. Pl. Calif. 427 (1925) as to Calif. pl. cited; Jepson, Flora Calif. ii. 59 (1936) as to pl. cited. *S. ovalis* Rydb. Fl. Rky. Mts. 329 (1917) as to Calif. range; O. E. Schulz, l. c. as to Calif. pl. cited. California: Lassen Peak, Shasta Co., 1875, *Lemmon 21* (G, type; C, M, NY, isotypes); Aug. 1882, Mrs. *R. M. Austin* (C); undated, *Chestnut* & *Drew 189* (ND).

Isolated nearly two hundred and fifty miles south of the nearest known collection of var. *typica*, this natural entity seems to have stabilized itself sufficiently to receive nomenclatorial designation. The outstanding characteristics are those of the pubescence which is of a long-villous type, covering the above-ground parts of the plants except the petals and fruits, and the siliques which are larger, longer, tapering at apex and tipped with a longer style than in var. *typica*.

Smelowskia ovalis is perfectly distinct from *S. calycina* with which it has been confused by some botanists. It is true that there is a marked superficial resemblance between specimens of the two species at anthesis or even when the fruits are young, but a closer scrutiny has consistently revealed differences which have been emphasized in the key and which are of a constant nature. The pronounced acicular hairs along the margins of the leaf-bases of *S. calycina* are exceedingly useful in determining vegetative or young specimens. In fruiting specimens a useful character for easy differentiation is found at the apex of the replum after the valves have been removed. In *S. ovalis* the replum forms an obtuse angle beneath the style, while in *S. calycina* the angle is invariably acute.

Var. *typica* of *S. ovalis* shows a perplexing variation in length and shape of pod and length of style, but a complete transition between the extremes has been repeatedly observed. *Thompson* 10,837 and *G. N. Jones* 10,325 from Mount Rainier, *Thompson* 10,837 from Burch Mt. and *Suksdorf's* specimen from Mount Adams all have pods which tend to be lanceolate, often approaching 4 mm. in length, and styles which usually approximate 1 mm. in length. However, the two Thompson collections show an almost complete transition from the ovoid short-styled pod more characteristic of the typical form of the species to the condition described above. Since these deviations from typical *S. ovalis* are neither stable nor geographically localized, they may be regarded as illustrating the natural variation of the species. This tendency of *S. ovalis* to vary toward *S. calycina* in pod-length and -shape as well as length of style points to its probable recent origin from the latter species. Assuming *Smelowskia* to have originated in south-central Siberia, where the largest number of species exist at the present time, the migration-route through Alaska to the Cordillera of North America is marked by the relict *C. calycina* var. *integrifolia*. This variety, now isolated from the parent species from both west and south, has been differentiated to its present biological status under environmental conditions strikingly different from those of the Altai and the Cordillera of our west, which have tended to preserve the specific nature of *S. calycina* var. *typica* in the two areas. It seems highly probable from the present geographic distribution of *S. calycina* that it formerly extended without disruption from the Altai to the Cordillera. From the restricted area in which *S. ovalis* is found, one might conclude that differentiation from the parent species took place after the genus had migrated well down onto the Cordilleran mountains.

Smelowskia ovalis reputedly grows at the highest elevation at which phanerogamic plants are found on Mount Rainier and other peaks of the Cascade Range.

Synopsis of the Genus Polyctenium

a. Pods somewhat bisulcate, decidedly flattened, pubescent at least when young, 5–8 mm. long, 1.5–2 mm. wide; plants rather densely pubescent. . . . . *P. Fremontii* var. *bisulcatum.*

a. Pods not bisulcate, flattened or nearly terete, glabrous, 6–13 mm. long, 1–1.5 mm. wide; plants sparsely pubescent *P. Fremontii* var. *typicum.*

P. Fremontii (Watson) Greene. Perennial, more or less caespitose; stems few to several from a branching naked caudex, simple or rarely

branched, sparsely to abundantly pubescent with simple or branched hairs, 5–15 cm. long; basal leaves sessile, 1–2 cm. long, pinnately divided into linear divisions, pubescent with stiff simple or forked or dendritic hairs, segments pungent; cauline similar, sessile, several to many, 5–12 mm. long; pedicels ascending, pubescent or glabrous, 4–6 mm. long; inflorescence corymbose, becoming racemose in fruit; sepals oblong, glabrous or slightly pubescent, 2–3 mm. long, 1–1.5 mm. broad; petals white, cuneate, truncate at apex, 5–6 mm. long, 3–4 mm. broad; pods glabrous, flattened contrary to septum or nearly terete, 6–13 mm. long, 1–1.5 mm. wide; style less than 1 mm. long, stigma unexpanded; seeds numerous (12–28), marginless, 1 mm. long, attached by a weak funiculus 1 mm. long, cotyledons incumbent.

Var. **typicum.** *P. Fremontii* Greene, Leafl. ii. 219 (1912). *Smelowskia ? Fremontii* Watson, Proc. Am. Acad. Arts & Sci. xi. 123 (1875). *S. Fremontii* Brewer & Watson, Bot. Calif. i. 42 (1876); Robinson in Gray, Syn. Fl. No. Am. i^{1}. 136 (1895); Howell, Fl. Northw. Am. i. 57 (1897); Frye & Rigg, Northw. Fl. 189 (1912); Schulz in Engler, Pflanzenr. iv^{105}. 358 (1924); Jepson, Man. Fl. Pl. Calif. 427 (1925); Tidestrom, Contrib. U. S. Nat. Herb. xxv. 239 (1925); Jepson, Fl. Calif. ii. 59 (1936). *S. Fremontii* var. *glabella* Schulz l. c. 359. *Braya pectinata* Greene, Erythea iii. 69 (1895). *P. glabellum* Greene, l. c.—Northern California and southern and eastern Oregon to central Idaho. Idaho: Sawtooth Nat. Forest, 1910, *C. N. Woods 28* (RM). California: without locality, 1873, *J. G. Lemmon;* Ewing Creek, Modoc Co., May 1894, Mrs. *R. M. Austin* (C, type of *Braya pectinata* Greene); Modoc Co., May 1879, Miss *S. A. Plummer;* Portola, Plumas Co., July 1911, *K. Brandegee* (C); Plumas Co., June 1878, Mrs. *R. M. Austin;* Eagle Lake and Madeline Plains, Lassen Co., *J. G. Lemmon* (C); Bray, Siskiyou Co., May 1913, *L. E. Smith 227.* Oregon: head of Dry Creek, Malheur Co., May 1896, *Leiberg 2147* (US, NY, type and isotype of *P. glabellum* Greene); camp at Dry Creek, Crook Co., June 1894, *Leiberg 336* (C, G); base of Steens Mts., May 1885, *Howell 351;* June 1885, *Cusick 1246;* hills about Lake Klamath, Klamath Co., May 1846, *Fremont 384* (G, type); Swan Lake Valley, Klamath Co., May 1896, *Applegate 41;* stony dry swales of desert, Harney Co., June 1901, *Cusick 2612* (C, G); 7 mi. west of Riley, Harney Co., May 1914, *Mrs. R. D. Cooper;* north end of Summer Lake, Lake Co., June 1911, *Eggleston 6856a;* Bear Valley, Blue Mts., May 1885, *Howell 769* (C); Prineville to Button Springs, June 1894, *Leiberg 336* (US).

Var. **bisulcatum** (Greene), comb. nov. Caespitose, rather densely pubescent with branched hairs; sepals pubescent; pods decidedly flattened contrary to replum, pubescent at least when young, somewhat bisulcate, 5–8 mm. long, 1.5–2 mm. wide.—*P. bisulcatum* Greene, Leafl. ii. 220 (1912). *Smelowskia Fremontii* var. *bisulcata* O. E. Schulz op. cit.—Known only from the type-collection, Oregon: Silvies Valley, Blue Mts., May 1885, *Howell 346* (US, type; G, NY isotypes).

Polyctenium Fremontii is reasonably homogeneous and occupies a geographical area which is unbroken by any major barrier. As the species is here interpreted, the natural variation easily includes Greene's *P. glabellum* which appears to be only a lax form developed as a result of shading or perhaps the receipt of a larger amount of water than the species normally obtains. Indeed Leiberg's notation "along streams" on the type-specimen is significant in this connection, since the species is usually found in a dry habitat. The laxity of habit, inflorescence and foliage, the branching stems and scanty pubescence of Greene's type are approached by a specimen collected in June 1894, between Prineville and Button Springs, Oregon, by Leiberg. These characters, though not quite typical, are possessed to a lesser extent by other plants throughout the natural range of the species. Thus it is evident that *P. glabellum* should be considered synonymous with the older *P. Fremontii*, even though Schulz, op. cit., who saw no specimens, retained it as a variety.

Possessing many features in common with *P. Fremontii* but with short, flattened, pubescent and somewhat bisulcate pods, *P. bisulcatum* Greene appears sufficiently distinct to require nomenclatorial recognition, but in varietal rank. A specimen, loaned for study by the Herbarium of the University of California and possessing short obtuse pods, a prominent style and other minor characters, was collected by Mrs. R. M. Austin in California. This specimen, probably representing a new and undescribed variety, is related to var. *bisulcatum* by virtue of its short pods but is otherwise distinctive. It is left undescribed because the material is fragmentary and accurate data are lacking.

Explanation of Plate 496[1]

A, Polyctenium. Figs. 2–10: Polyctenium Fremontii var. typicum. Figs. 11–13: P. Fremontii var. bisulcatum. Fig. 2: diagram of a transverse section, at lower filament-level, of a young flower, *c* sepal, *p* petal, *ls* long stamen, *ss* short stamen, *s* septum, *g* gynoecium. Fig. 3: diagram of transverse section through mature silique. Figs. 4 and 5: two lateral views (at right angles to each other) of a mature silique. Fig. 6: transverse section of a seed. Fig. 7: sepal. Fig. 8: petal. Fig. 9: lateral view of seed. Fig. 10: stamen.

B, Smelowskia. Figs. 14–17 and 22–27: Smelowskia calycina var. typica. Fig. 18: S. ovalis var. congesta. Figs. 19–21: S. ovalis var. typica. Fig. 14: diagram of a transverse section, at lower filament-level, of a young flower, symbols as in fig. 2. Fig. 15: diagram of a transverse section through mature silique. Fig. 16: lateral view of a mature silique. Figs. 17, 18 and 19: lateral view of replum of three entities. Fig. 20: lateral view of silique. Fig. 21: lateral view of seed.

[1] All figures × 3½, except 2, 3, 14, and 15 which were drawn free-hand from a microscopic enlargement.

IV. THE NAMES OF THREE SPECIES OF BRASSICA

Louis C. Wheeler

Three mustards introduced as weeds in North America are commonly known under untenable names. They have been known as *Brassica alba* (L.) Rabenhorst, *B. arvensis* (L.) Rabenhorst, and *B. adpressa* (Moench) Boiss. Under *Sinapis* the first two are perfectly valid. But *Sinapis* seems scarcely worthy of generic rank. The following study of the nomenclature of these three species is based on the synonymy given by O. E. Schulz, Pflanzenreich IV. **105**(1):—1919. Of course the specific names cited under the varieties of each species are included in the elimination. The fact that Schulz considered the misapplication of a name as publication of a new species accounts for the large number of specific names attributed by him to various authors when the names were merely "*sensu*," i. e., misapplied.

Brassica hirta Moench, Suppl. Methodum Pl., 84. 1802. This is the earliest available name for what has long been known in American manuals under the name of *Brassica alba* (L.) Rabenhorst, Fl. Lusatica **1**: 184. 1839 (Boissier, Voy. Espagne **2**: 39. 1839–45 is more generally given as the combining author but the date of his publication is uncertain), based on *Sinapis alba* L., Sp. Pl. **2**: 668. 1753; not *Brassica alba* Gilibert, Fl. Lituanica. I have not seen this reference, cited "ii. 63" by Index Kewensis (also cited "IV. (1782) 63," by O. E. Schulz, l. c., 83.), but I have seen what is supposed to be the same paper in Uster, Delectus Opusculorum Bot. **2**: 361. 1785. Here Gilibert described his *B. alba* as a new species. There are the two following preoccupied names which are earlier than Moench's: *Raphanus albus* Crantz, Classis Cruciform. Emend., 109. 1769, proposed without reference to *Sinapis alba* L., though the same two pre-Linnaean polynomials are cited in both cases; not *Brassica alba* Gilibert, *vide supra*. "*Sinapis nigra* Kerner, Abbild. oekonom. Pflanz. V (1792) t. 465;" cited by Schulz, l. c., 130, but not confirmed, is preoccupied by *Brassica nigra* (L.) Koch, 1833, if it is not a mere misapplication of *Sinapis nigra* L.

Brassica **kaber** (DC.), comb. nov. *Sinapis kaber* DC., Syst. **2**: 617. 1821.

This is the plant that, under the genus *Brassica*, has commonly been called *B. arvensis* (L.) Rabenhorst, Fl. Lusatica **1**: 184. 1839, based on *Sinapis arvensis* L., Sp. Pl. **2**: 668. 1753; not *Brassica*

arvensis L., Mantissa, 95. 1767. *Sinapis orientalis* L., Cent. Pl. **1**: 19. 1755; not *Brassica orientalis* L., Sp. Pl. **2**: 666. 1753. "*Sinapis arvensis* Curtis, Fl. londin. 1. ed. II (1777–1787) t. 321," (Schulz, l. c., 123) was a mere varietal misapplication of *Sinapis arvensis* L. *Raphanus orientalis* Crantz, Classis Cruciform. Emend., 109. 1769, was published without reference to *Sinapis orientalis* L. but the same polynomial of Tournefort was cited under both; not *Brassica orientalis* L., 1753. *Sinapis torosa* Gilibert, Fl. Lituanica (reference not seen, given as "ii. 69" by Index Kewensis, and "IV. (1782) 69" by Schulz, l. c., 119) is an abortive name since, according to the transcript of the description kindly supplied by Mr. Ramsbottom of the British Museum, *Sinapis arvensis* L. was cited in synonymy. Illegitimate names are not to be taken into consideration for purposes of priority (Rules, Art. 60. 1935). "*S. nigra* Rozier, Dict. Univ. Agricult. VI. (1785) 676, t. 23;" (Schulz., l. c., 119) not seen, probably *S. nigra* L. *sensu* Rozier; if not, preoccupied by *Sinapis nigra* L., 1753. *Raphanus arvensis* Crantz, Classis Cruciform. Emend., 109. 1796, not based on *Sinapis arvensis* L. but description identical and the same two pre-Linnaean polynomials cited in synonymy, not *Brassica arvensis* L., 1767. "*Sinapis orientalis* Schkuhr, Bot. Handb. II. (1805) 264, t. 186, non L." (Schulz, l. c., 123–4) must be *S. orientalis* L. *sensu* Schkuhr. There are no authors cited by Schkuhr for adjacent species in this genus but in view of the fact that the *Sinapis* names are identical with those published by Linnaeus it seems reasonable to consider them as Linnaean species. Even if this were a new species it is preoccupied under *Brassica* by *B. orientalis* L., 1753.[1] "Raphanus raphanistrum Kerner, Oekon. Pfl. II. (1788) 98, t. 166, non L." (Schulz, l. c., 119) is probably a *sensu* name but the reference is not available. If it is new it is preoccupied by *R. Raphanistrum* L., 1753. "*S.*[*inapis*] *hispida* Balbis, Miscell. Bot. (1804–1806) 33, non Schousb." (Schulz, l. c., 123) is really a *sensu* name which traces nomenclatorially to *S. hispida* Schousb. which Schulz, l. c., 134, identifies with *S. flexuosa* Poiret. *Sinapis polymorpha* Generisch apud Schultes, Obs. Bot., 133. 1809, is an apparently abortive name seemingly based on *S. laevigata* L.; not *Brassica polymorpha* Murray "in Nov. Comment. Soc. Reg. Scient. Gotting. VII. (1776) 35 t. VI"

[1] The date given by Schulz, l. c., 123, for Schkuhr's Handb. seems to be in error. Pritzel lists two editions only and both are before me. Vol. 2, ed. 1, bears the date 1791, vol. 2, ed. 2, bears the date 1808. Pagination is identical at least for *Sinapis orientalis*.

(Schulz, l. c., 84), original not seen but the name checked in Linn. Syst. Veg. ed. **14**: 601. 1784. *Sinapis villosa* Mérat, Nouv. Fl. Envir. Paris, 265. 1812; not *Brassica villosa* Bivona-Bernardi, "Stirp. rar. Sicil. descr. Manip. IV. (1816) 20;" (Schulz, l. c., 38), not seen but confirmed in Sprengel, Syst. Veg. ed. 16, **4**: Cur. Post. 243. 1827. "*S.*[*inapis*] *taurica* Fischer!, Catal. Hort. Gorenk. (1812) 51; DC. Syst. II. (1821) 617 et Prodr. I. (1824) 219 (excl. Marsch. Bieb.)," (Schulz, l. c., 119), is another *sensu* name. This name was first published by Fischer in his Catalogue du Jardin des Plantes du Comte A. de Razoumoffsky à Gorenki, ed. **2**: 51. 1812, where it appears without description and is credited to M.[arschall von] B.[ieberstein]. As Fischer learned later, the plants raised in Razoumoffsky's garden from seeds sent by Marschall were not the plant which Marschall described in 1819, which was *Brassica geniculata* (Desf.) Ball, but *Sinapis arvensis*, as was shown by Fischer & Meyer, Index Seminibus Hortus Petropolitanus **1**: 38. 1835. It is easy for confusion to arise in plants raised from seeds. Garden labels may be misplaced or the wrong seeds may have been planted. Whatever caused the confusion, the error was not rectified in time to prevent de Candolle from drawing his description for the Systema and Prodromus at least in part from a specimen prepared by Fischer from the plant of the Razoumoffsky garden. This explains Schulz' citation. . . . "*S. incana* Kit. ap. Schultes, Österr. Fl. 2. Aufl. II. (1814) 265, non L.," (Schulz, l. c., 123) is really *S. incana* L. *sensu* Kit., for, through the reference "S. P. III. 558.," it traces through Willd., Sp. Pl. **3**(**1**): 558. 1801 (date fixed by Rules, Art. 45. 1935), to L., Cent. Pl. **1**: 19. 1755. *Sinapis retrohirsuta* Besser apud Steudel, Nomencl. ed. **1**: 782. 1821, *nomen nudum*.

The specific name *Brassica kaber* applies to the plant called *Sinapis arvensis* L. var. *brevirostris* (Spach) O. E. Schulz. This is not the plant of America according to Schulz' interpretation. The two following varietal names apply to the plants of the New World:

Brassica kaber (DC.) Wh. var. **pinnatifida** (Stokes) comb. nov. *Sinapis arvensis* L. β *pinnatifida* Stokes, Bot. Mater. Medic. **3**: 478. 1812. Type-locality: apparently England. (*S. arvensis* α *integrifolia* Stokes, l. c., 477). This is typical *Brassica arvensis* (L.) Rabenhorst. (*B. sinapistrum* Boiss., Voy. Espagne **2**: 39. 1839–45, based on *Sinapsis arvensis* L.).

Brassica kaber var. **Schkuhriana** (Reichenb.) comb. nov. *Sinapis Schkuhriana* Reichenbach, Icones Fl. Germ. **2**: 20, t. 87, fig. 4425b. 1837–8. *S. arvensis* L. β *Schkuhriana* Reichenb. apud Hagenbach, Fl. Basil. Suppl., 138. 1843. *Brassica arvensis* (L.) Rabenh.

var. *Schkuhriana* (Reichenb.) Thellung apud Schinz & Keller, Fl. Schweiz. ed. 3, **2**: 131. 1914.

Brassica geniculata (Desf.) J. Ball in Journ. Linn. Soc. Bot. **16**: 327. 1878, based on *Sinapis geniculata* Desf., Fl. Atlantica **2**: 98. 1798.[1] Type-locality: North Africa.

This is the plant which has generally passed as *Brassica adpressa* (Moench) Boiss. in California, where it is a common weed. The following synonymy shows why *B. geniculata* is the valid name for this species. *Sinapis incana* L., Cent. Pl. **1**: 19. 1755, basis of *Brassica incana* (L.) Meigen, Deutschl. Fl. **3**: 270. 1842; not Tenore, Prod. Fl. Napol., p. xxxix. 1811–15 (not seen but kindly verified by Miss M. L. Green of Kew). *Raphanus incanus* Crantz, Classis Cruciform. Emend. 110. 1769, proposed without reference to *Sinapis incana* L. but doubtless identical since the same polynomial is cited; not *Brassica incana* Tenore, 1811–15. "*Sinapis incana* Jacq. Hort. Vindob. 2: 79, t. 169. 1772," cited by Schulz, l. c., 141, under *Hirschfeldia incana* (L.) Lagrèze-Fossat var. *hirta* (Babington) O. E. Schulz, is really *Sinapis* (or *Hirschfeldia*) *incana* L. *sensu* Jacq. which was merely a varietal misapplication. *Hirschfeldia adpressa* Moench, Method., 264. 1794 is an abortive name, since *Sinapis incana* L. was cited in synonymy, consequently this name is not to be considered for purposes of priority (Rules, Art. 60. 1935), and *Brassica adpressa* (Moench) Boiss., Voy. Bot. Espagne **2**: 38. 1839–45, must not be used since there are earlier available names. "*Sinapis nigra* Pallas, Tabl. Taurid. (1795) 54;" (Schulz, l. c., 137), is probably *S. nigra* L. (1753) *sensu* Pallas; if not, it is preoccupied both under *Sinapis* and under *Brassica*.

V. POLYGONUM KELLOGGII AND ITS ALLIES

Louis C. Wheeler

This paper presents a taxonomic synopsis of five small annual species of *Polygonum*, section *Aviculatia*, of which *P. Kelloggii* Greene is the most widespread. The confusion as to the identity of the types of the species as well as to their delimitation makes this synopsis worth while. The following key summarizes the specific distinctions:

Anther-bearing stamens 8.

Leafy bracts of inflorescence well differentiated from leaves of lower stem by an evident white margin and greater relative breadth.

[1] Stearn, Journ. Soc. Bibliogr. Nat. Hist. 1: 147–8. 1938.

Inflorescence broadly oblong or ovoid, often nearly as broad as long.....1. *P. polygaloides.*
Inflorescence slenderly cylindric, 4–12 times as long as broad 2. *P. esotericum.*

Leafy bracts of inflorescence little different from leaves of lower stem, white margin lacking generally, never more than a hairline.....3. *P. Watsonii.*
Anther-bearing stamens 3.
Plants mostly less than 8 cm. tall, often sprawling; leafy bracts of inflorescence rarely white-margined; inflorescence either terminal or extending well down the stems.....4. *P. Kelloggii.*
Plants mostly 8–19 cm. tall, erect; bracts of inflorescence with an evident white margin; inflorescence always terminal 5. *P. confertiflorum.*

Unless otherwise indicated all specimens cited below are in the Gray Herbarium.

1. POLYGONUM POLYGALOIDES Meisner, DC. Prod. **14**: 101. 1856.—Type locality: "In Clear-Water, Oregon (Spalding)." (The Rev. Spalding lived at "Lapwai on the Clearwater River a dozen miles above its mouth."[1] This is now in Nez Perce County, Idaho. Spalding's specimens collected in this general vicinity were distributed as from "Clearwater, Oregon.") Probable isotype at Gray Herbarium. Range: Eastern Washington, northeastern Oregon, Idaho, and reported by Small, Mem. Dept. Bot. Columbia Coll. **1**: 136. 1895 (Monogr. N. Am. Polygonum), from Montana.

2. POLYGONUM (AVICULARIA) **esotericum** sp. nov. (FIG. 1). Annuum, glabrum, nanum; caule erecto vel declinato, 6–14 mm. longo; ochreis hyalinis, tripartitis; foliis linearibus, acutis, 8–10 mm. longis; bracteis imbricato-adpressis, 2–5 mm. longis, lanceolatis vel oblongo-lanceolatis, prominulo-1-nerviis medio circumscripte viridibus margine albido-membranaceis; inflorescentiis terminalibus, racemosis, graciliter cylindraceis, folioso-bracteatis, 2–7 cm. longis; floribus 8-andris; calyce 1.8–2.2 mm. longo, 5-partito, carinato-trigono; achaenio triquetro vel basi subtereto, faciebus anguste lanceolatis vix ovato-lanceolatis, laevissimo nitido vix reticulato-striato opaco.

Glabrous annual herb; stem erect or at first declined, 6–14 cm. long, with several erect branches from near the base; leaves linear, 8–10 mm. long, acute, falling early; leafy bracts of inflorescence ascending-appressed, 2–5 mm. long, lanceolate to oblong-lanceolate, midrib elevated on lower surface, margin white, scarious, mostly reflexed, mainly entire: ocreae membranous, scarious, sheathing, 3-parted, jointed to leaves and leafy bracts; inflorescence a terminal, slenderly cyclindric, spicate raceme 2–7 cm. long; flowers shortly pedicelled, 1–3 in the axil of each bract; fruiting calyx nearly equaling to slightly exceeding the achene, 2–3 mm. long, five-parted to below the middle, segments oblong-lanceolate, 2 outer manifestly longer than the rest even in bud, tips of the 2 outer segments folded together and united;

[1] Chas. H. Chapman, The Story of Oregon and Its People, 85 1909.

stamens with anthers 8 (vide infra), 3 inner filaments dilated below; styles 3, short, capitate; achene 1.8–2.2 mm. long, shorter than to slightly exceeding the calyx, pale brown, shining, narrowly lanceolate in outline, and subterete below and trigonous above, to longitudinally striate-reticulate, dark brown and ovate-lanceolate in outline and

Fig. 1. Polygonum esotericum. *a*, Habit × 1; *b*, Bract of inflorescence × 3; *c*, Flower × 8; *d*, Outline of smooth slender achene × 8; *e*, Striate-reticulate achene × 8. All from the type.

Map 1, Range of Polygonum polygaloides; 2, of P. esotericum; 3, of P. Watsonii; 4, of P. Kelloggii; 5, of P. confertiflorum.

trigonous throughout.—The following collections are referred here: California: Modoc Co., dry sunny seasonally submersed adobe bed of artificial lake, with *Pogogyne zizyphoroides* Bentham, *Plagiobothrys leptocladus* (Greene) I. M. Johnst., *Downingia elegans* Torrey, and *Psilocarphus globiferus* Nuttall, Rim Rock Valley Reservoir (Section 21, Township 46 North, Range 12 East, Mount Diablo Meridian), Devils Garden, Aug. 25, 1935, *Louis C. Wheeler 3918* (Gray Herbarium,

type; author's herb., isotype), *3919* (Gray Herb.). Oregon: Klamath Co., dry pond-basins, Swan Lake Valley, July 19, 1895, *E. I. Applegate 620*. This last collection is rather over-mature but seems to belong here. Map 1.

The two collections from California, though from the same locality, represent two slightly different elements. The two were growing intermingled though they showed a barely perceptible difference in their environmental preferences. One preferred spots an inch or two lower which would be wet later. No. 3918 has all eight stamens with fertile anthers, its inflorescence less dense, and the leafy bracts with narrower white margins; achenes narrowly to broadly lanceolate in outline and the narrowest smooth and pale brown. No. 3919 has the inner whorl of three stamens with fertile anthers but the outer whorl of five with shrivelled mostly sterile anthers, its inflorescence more dense and the leafy bracts with wider white margins; achenes lanceolate to ovate-lanceolate in outline, the narrowest smooth but chocolate-brown. The occurrence of these two entities, one obviously evolved from the other or both from a common ancestor, together and yet, so far as observed, without intermediates, is very puzzling. This would seem to cast doubt on the universal applicability of the belief, variously expressed but rather generally held, that a space-barrier of some sort is necessary for the isolation of an incipient new organic entity from its immediate ancestor. This may be a fairly valid rule for animals but in plants polyploidy or physiological factors of various sorts may create an effective barrier against formation of fertile hybrids, or may separate the flowering periods thus creating a chronological barrier.

The race of *P. esotericum* with only 3 fertile stamens can be distinguished from *P. confertiflorum* and *Kelloggii* by its very slender inflorescence and narrower achenes as well as by the rudimentary sterile anthers on the outer whorl of 5 stamens. Though the key is believed to be workable as stated, the sterile anthers in this race of *P. esotericum* are so small that they are difficult to see with a hand lens.

3. P. Watsonii Small in Mem. Dept. Bot. Columbia Coll. **1**: 138. 1896, based on *P. imbricatum* Nutt. apud. S. Wats., Amer. Nat. **7**: 665. 1873 (in King, Rep. Geol. Expl. 40th Par. **5**: 316. 1871, in synon.), not Raf., Fl. Tell. **3**: 16. 1837.[1]—Type: "R[ocky] Mts.—U.[pper] Calif.", *Nuttall* (Gray Herb.).

That the type of *P. imbricatum* (and therefore of *P. Watsonii*) probably came from outside California as now delimited is suggested by

[1] See Barnhart, Torreya 7: 182. 1907 as to date.

the fact that no other specimens of this species purporting to have come from California have been seen. The plant illustrated by Small, idem, as *P. Watsonii* is *P. confertiflorum* Nutt. as Piper, Contr. U. S. Nat. Herb. **11**: 228. 1906 (Fl. Washington), maintained. The description at least in large part also applies to *P. confertiflorum* but neither the figure nor description of the calyx applies to either *P. confertiflorum* or *P. Watsonii* but agrees essentially with *P. Kelloggii*. Piper, idem, considered *P. Watsonii* identical with *P. Kelloggii*. He placed his faith in the character of the surface of the achene. It happens that the type of *P. Watsonii* has both smooth and reticulate achenes which may still be observed *in situ*. Piper noticed a smooth achene and assumed that all were smooth. Other specimens of *P. Watsonii* have dimorphic achenes. Surface dimorphism of *Polygonum* achenes was noted by Watson, King, Rep. Geol. Expl. 40th Parallel **5**: 316. 1871 (*sub P. coarctatum* var. *minus*) for the plants included in *P. imbricatum* Nutt. Other types of achenial dimorphism in *Polygonum* have been noted by Bicknell, Bull. Torr. Club **36**: 450. 1909 (Fl. Nantucket), and by Small, l. c., **24**: 46. 1897.

The following exsiccatae will illustrate my interpretation of the species and show its range: CANADA: Cypress Hills, Great Plains (in both Alberta and Saskatchewan, center at 110° W. long., 49° 40′ N. lat.), *J. Macoun 149*. ALBERTA: Hand Hills, *J. Macoun 190*. MONTANA: Teton Co.?, Birch Lake, *Wm. M. Canby 279*. WYOMING: Sublette Co., New Fork Lakes, *E. B. & L. B. Payson 4381*. Uinta Co., Jackson's Lake, *Aven & Elias Nelson 6556*. Albany Co., Chimney Park, *E. Nelson 656*. UTAH: Garfield Co., Aquarius Plateau, *P. A. Rydberg & E. C. Carlton 7476*. NEW MEXICO: San Juan Co., Tunitcha Mts., *P. C. Standley 7632*. WASHINGTON: Grant Co., Coulee City, *C. V. Piper 3901, 3902*. Adams Co., Ritzville, *J. H. Sandberg & J. B. Leiberg 200*. OREGON: Klamath Co., 12 mi. w. of Keno, *M. E. Peck 9308*; Pelican Bay, w. side Upper Klamath Lake, *M. E. Peck 9509*. Crook Co., Button Springs, *J. B. Leiberg 367*.

4. P. KELLOGGII Greene, Fl. Franciscana, 134. 1891.—Type: near Donner Lake, Sierra Nevada, Nevada Co., California, Dr. *A. Kellogg* in 1870. Dr. Theodor Just kindly examined the Herbarium Greeneanum at Notre Dame and reports that Greene indicated as type the above collection in his herbarium. *P. unifolium* Small in Mem. N. Y. Bot. Gard. **1**: 129. 1900 (Fl. Montana), type: Cedar Mts., Montana, *Rydberg & Bessey 5367* (Herb. N. Y. Bot. Gard.), this specimen marked "type" by Rydberg. *P. minutissimum* L. O. Williams, Ann. Mo. Bot. Gard. **21**: 343. 1934, may belong here. Range: British Columbia, Washington, Oregon, California, Idaho, Wyoming, Colorado, Utah, Nevada.

All references to the occurrence of *P. Watsonii* in California are in error, as far as the specimens I have examined are concerned and according to my interpretation. Most, perhaps all, such references are to plants referable to *P. Kelloggii*. Jepson, Fl. Calif. **1**: 382–3. 1914, maintained both *P. imbricatum* and *P. Watsonii*. He excluded the synonymic type upon which *P. Watsonii* was based and evidently intended to apply the uame to the supposed entity defined by Small under that name. Since Small's description applies mainly to *P. confertiflorum*, Jepson's application of Small's description is largely in error. From Jepson's description it appears that he applied *P. imbricatum* to the very race upon which Greene based *P. Kelloggii* (I am applying *P. Kelloggii* in a broader sense) and that he applied *P. Watsonii* in such a way as to include plants with 3 anther-bearing stamens (here interpreted as *P. Kelloggii*) as well as those extralimital plants with eight anther-bearing stamens (here interpreted as *P. Watsonii*) so long as they had dark-colored more or less striate achenes. *P. imbricatum* Nutt. var. *Watsonii* Small apud Jepson, Man. Flow. Pl. Calif., 290. 1923[1] is based on the same confusion and interpretation as Jepson's previous use of both names in specific rank. It would be interesting to know what Jepson took as the type of *P. Watsonii* Small. Incidentally it is only by taxonomic inference and similarity of the name that the var. *Watsonii* is assumed to be based on the species *Watsonii* for no name-bringing synonym is cited and there is no indication that the variety was new.

Polygonum Kelloggii Greene, as here defined, is an aggregate of numerous apparently hopelessly intergrading races. The particular race which Greene described is perhaps best represented in the extreme by *Smiley 690* cited below. *A. A. Heller 6929*, "From type locality," Donner Lake, Sierra Nevada, Nevada Co., California, has some dark brown, conspicuously reticulate achenes in some plants. All the plants have the leafy bracts pointing upward, rather than spreading as in *Smiley 690*. The habit of the bracts in *Heller 6929* combined with the dark achenes makes this collection intermediate between what Greene, l. c., 135, called *P. imbricatum* and his new species *P. Kelloggii*. Some few collections contain plants that are taller than the measurements given in the key. The two following collections are, on the average, taller than 8 cm. and one plant is 12 cm. tall: California-

[1] Title-page date questionable but here accepted for convenience as no conflict as to priority is involved.

NIA: Yosemite National Park, near Dark Hole, Tioga Road, altitude 7,600 ft., *F. J. Smiley 883;* Yosemite Valley, altitude 4,000–4,500 ft., *L. R. Abrams 4502.* These two, with the third collection cited below, represent a local race of *P. Kelloggii* characterized by short, broad, pale, reticulate achenes; generally greater height; and compact inflorescence: Cathedral trail to Mt. Tallac, alt. 6,700 ft., Sierra Nevada, California, *F. J. Smiley 209.* This race is distinguished readily from *P. confertiflorum* by the absence of white margins on the bracts and by the pale short achenes. Occasional collections of *P. Kelloggii* show very narrow white margins on the bracts: OREGON: Dead Indian Valley, summit of Cascade Mts., *W. C. Cusick 2953;* CALIFORNIA: Round Valley, Mendocino Co., *J. W. Blankinship*, June 8, 1873, *s. n.* This last closely approaches *P. confertiflorum.* Plants of very distinctive appearance are those from Lake Tenaya, Yosemite National Park, California, *F. J. Smiley 690.* Though heavily fruiting these plants have entirely simple stems not over 2 cm. high. But *A. Eastwood 487* from the same place has the more usual habit of *P. Kelloggii* and smooth pale achenes which match those of *Smiley 690.* This race with smooth, short, pale achenes seems to be confined to the Sierra Nevada, California. *P. unifolium* Small represents another apparent race with elongated lower internodes and very short terminal inflorescence. Whether this habit is hereditary or due to crowding by other low herbs is difficult to decide. The presence of both the usual sprawling and the erect habit in various collections, as Snake River, Uinta Co., Wyoming, *A. & E. Nelson 6463* (distributed as *P. polygaloides*), suggests that the erect habit is ecological.

It may be possible by careful study of a large series of specimens to recognize and define several minor entities from the aggregate here included in *P. Kelloggii.* Criteria which may prove useful but which must be carefully weighed, rather than assumed to be usable and arbitrarily applied, are: general habit; differentiation of leaves; aggregation of inflorescence; relative length of calyx-segments and length of the conduplicate and united tips of the longer ones; presence or absence of sterile stamens; shape, surface, and color of achenes.

5. P. CONFERTIFLORUM Nutt. apud Piper in Contr. U. S. Nat. Herb. **11**: 228. 1906 (Fl. Washington), not Dougl. apud Hooker, Fl. Bor.-Am. **2**: 132. 1838,[1] in synonymy. TYPE: "Columbia, &c. plains" [quoted from the label], *Nuttall* (Herb. Gray). *P. conferti-*

[1] See Erythea 1: 160. 1893 as to date.

folium Nutt. apud S. Wats. in King, Rep. Geol. Expl. 40th Parallel **5**: 316. 1871, in synonymy. Based on the same specimen as Piper's similar name. Piper misread the name Nuttall had written on the label of the type. Whether the name should be "corrected" is difficult to decide. There is the unhappy possibility that *P. confertiflorum* Dougl. may have been validated before Piper's validation of Nuttall's name. However, Douglas' name does not seem to have been validated.—Range: Washington: Spokane Co., Spangle, *W. N. Suksdorf 4777.* Klickitat Co., Falcon Valley, *W. N. Suksdorf 478.* Oregon: Marion Co., Salem, *J. C. Nelson 1614.* Josephine Co., Grants Pass, *C. V. Piper 6264;* Takilma, *M. E. Peck, 8145.* Jackson Co., Fall Creek, *E. B. Copeland 3469.* Wasco Co., Mosier, *J. W. Thompson 5156.* California: Shasta Co., Goose Valley, *A. Eastwood 1022.*

P. confertiflorum is usually readily distinguishable from *P. Kelloggii* by the characters in the key. Confusing plants are discussed above.

The number of anther-bearing stamens in this group of five species is either three or eight. The plants in which I find but three anther-bearing stamens have often been described as having five stamens, yet in the ninety-six odd collections in which stamens were counted the numbers were all either three or eight anther-bearing stamens except for one case in *P. confertiflorum* in which there was a fourth filament bearing a rudimentary anther in one flower. Except for this case and *Wheeler 3919*, discussed under *P. esotericum*, all anthers present were fertile. The anthers fall at a touch in dissecting mature flowers. Consequently counts are best made in unopened flowers. Perhaps counts of "five" have been made by counting filaments in mature flowers in which the anthers had fallen without consideration of whether the filaments had borne anthers. It appears that in these five species there is an inner whorl of three stamens which are always fertile and a potential outer whorl of five stamens. This outer whorl may be reduced to such an extent that it may not be manifested by any external structure, or represented by filaments of various sizes, or present as five anther-bearing stamens. It would be reasonable to suppose that there might be intermediate numbers of anther-bearing stamens but except for the one case noted none was found. In order to check the possibility that both three and eight anther-bearing stamens might occur in different flowers on the same plant two flowers were examined from one plant in about half the collections studied and no plants were found with both three and eight fertile stamens. The possibility that, while the number of anther-bearing

stamens was uniform in one plant, different plants in the same population might have different numbers was checked by two methods: (1). The anther-bearing stamens were counted in one flower in each of ten plants in one collection (Oregon, *Leiberg 240*) of *P. Kelloggii* and all had three. The same count was made in two collections (Oregon, *Leiberg 367;* New Mexico, *Standley 7632*) of *P. Watsonii* and all had eight. (2). *P. Kelloggii* is very common in California but in the collections examined there were no plants with the same general aspect but with eight fertile stamens (*P. Watsonii*) from California. Likewise *P. Kelloggii* occurs in Nevada but no collections of *P. Watsonii* were seen from that state. *P. esotericum* occurs in California and has eight anther-bearing stamens but is readily distinguishable from *P. Kelloggii* by the slenderly cylindric inflorescence, white margins of the bracts, narrower achenes, and eight anther-bearing stamens; and from *P. Watsonii* by the characters already given in the key. Consequently there is both statistical and phytogeographic evidence that, while *P. Kelloggii* and *P. Watsonii* are often indistinguishable by habit and aspect, the difference in their numbers of fertile stamens is not due to either chance or vigor of the plants.

The two following species were published without designation of the precise specimen upon which they were based or the locality given was vague:

Polygonum minimum S. Wats. in King, Rep. Geol. Expl. 40th Parallel **5**: 315. 1871.

The type, in Herb. Gray, came from Bear River Canyon, Uinta Mts., Utah, alt. 10,500 ft., Aug., 1869, *Sereno Watson 1058.*

Polygonum shastense Brewer in Proc. Am. Acad. **8**: 400. 1873.

In view of the specific name it seems appropriate to take *Brewer 1382* from Mt. Shasta, Siskiyou Co., California, as the type. Brewer gives the following data in his field-notebooks: "1382 Polygonum. A nearly prostrate shrub. 8000′ to 9000′ alt.—fls. rose, deepest on midvein of petal. Stam. 8—(number inconstant ?) Stig. 3-cleft." Sept. 13 (?), 1862, not 1863 as stated on printed label-heading.

VI. THALICTRUM POLYCARPUM S. WATS., A DISPUTED NAME

Louis C. Wheeler

There are two problems involved in this name: (1) What is the type? (2) Is the name available?

(1) *Thalictrum polycarpum* was published by Sereno Watson, Proc. Am. Acad. **14**: 288. 1879, in an article entitled: Descriptions of some new Species of North American Plants. In synonymy were cited: ". . . T. Fendleri, var. (?) polycarpum, Torr. in Pacif. R. Rep. 4. 61, in part. T. Fendleri, Brew. & Wats. Bot. Calif. 1.4, mainly." Watson's next reference to his species is Bot. Calif. **2**: 424. 1880, where he cites only the first synonym given above, again "in part." In the Synop. Fl. N. Am. **1(1)**: 16. 1895, only the originally cited synonyms are given. In view of the fact that in no case did Watson state definitely on what part of *T. Fendleri* var. ? *polycarpum* his *T. polycarpum* was based and since he gave no indication of how he disposed of the remainder of the synonym, the species must, nomenclatorially, stand as Watson's solely rather than (Torr.) Watson. That means that the type must be sought at the Gray Herbarium. Davis, Minn. Bot. Studies, ser. 2, pt. **4**: 509–523. 1900 (Synonymic Conspectus of the Native and Garden Thalictrums of North America), does not consider the matter of types. The publication (by Torrey) in Pac. RR. Rep. **4(5)**: 61. 1857, is as follows:

"Thalictrum Fendleri, Engelm. in Gray, Pl. Fendl. p. 5; var. ? polycarpum: glaberrimum; carpellis numerosioribus eglandulosis. Mountain ravines, New Mexico. In fruit October, &c. Sides of rivulets, Napa valley, California, April 25, (with immature fruit). It occurs in Coulter's California collection, in flower only . . ."

In Plantae Fendlerianae neither locality nor collection is cited for *Thalictrum Fendleri*. An examination of the specimens of *T. Fendleri* at the Gray Herbarium reveals that the species is evidently based on Fendler *no. 13* in 1847 from New Mexico. Fendler's field notes (or a copy?) at the Gray Herbarium fail to elucidate matters. Someone, in the copy of the Pac. RR. Rep. 4 at the Gray Herbarium, has indicated that the New Mexican specimens belonged to *T. Fendleri*. But the field notes state: "Santa Fe, Creek-valley, shady places, margin of irrigating ditches at the foot of perpendic. rocks. 13th June–1st July in flower, 19th July in fruit". Since these data as to the type cannot be reconciled with "Mountain ravines, New Mexico. In fruit October, &c." there is no proof that there was any mistake made by Torrey, idem.

Watson applied *T. polycarpum* to a Californian entity and subsequent authors have followed him. The least confusion will be caused if the type chosen for *T. polycarpum* Wats. is the Napa Valley collection of Bigelow cited by Torrey under *T. Fendleri* var. ? *polycarpum*.

There is a specimen of this collection at the Gray Herbarium and I consider this the type of *T. polycarpum* Wats. An attempt was made to determine whether Torrey ever intended to apply the name *T. Fendleri* var. ? *polycarpum* to any New Mexican specimens. The folders of *T. Fendleri* and *polycarpum* at the New York Botanical Garden, where Torrey's herbarium is now kept, were examined. No specimens from New Mexico were labeled *T. Fendleri* var. ? *polycarpum*. But for that matter the Bigelow specimen from Napa Valley in 1853–4 was named only *T. Fendleri* Engelm. The Coulter specimen mentioned above was not found at New York. At the Gray Herbarium a sheet of the Bigelow collection is labeled *T. Fendleri* var. ? *polycarpum*. Also there is a staminate specimen collected by Coulter in California without date or number. This was originally labeled *T. Fendleri* but a later hand added *T. polycarpum*. It appears that Torrey may have sent his specimens to Asa Gray. Perhaps the Bigelow specimen at the Gray Herbarium should be considered the type of both *T. Fendleri* var. ? *polycarpum* Torrey and *T. polycarpum* Wats.

(2) Greene, Muhlenbergia **5**: 128. 1909: "It is also now apparent that the name T. polycarpum is untenable. It had been chosen to designate an Old World member of the genus twenty years before Mr. Watson attempted to employ it. Since, then, the Watsonian type must be named anew, I shall take this occasion to give it a fuller description." The earlier *T. polycarpum* referred to by Greene was published by Loret, Bull. Soc. Bot. Fr. **6**: 17. 1859, after describing the puzzling plant he was considering, in these words: "S'il m'était réservé de lui imposer un nom, je lui donnerais volontiers celui de *Th. polycarpum* ou mieux *multiflorum* . . ." Hence this is an illegitimate name of the type known as a *nomen provisorium*. Provisional names[1] are not only illegitimate but are not validly published.[1] Since they are not validly published they cannot, as earlier homonyms, invalidate a later name.[2] Lecoyer, Bull. Soc. Bot. Belg. **24**: 78–324. 1885 (Monogr. Thalictrum), cites, p. 304, *T. polycarpum* Loret in synonymy and gives no adoption of the name by any other author. Hence *T. polycarpum* S. Watson is a valid name.

Greene, l. c., 129, published *T. ametrum* as a new name for *T. polycarpum* S. Watson. Jepson, Flora Calif. **1**: 530. 1922, states, after

[1] See Zesde Internat. Bot. Proc. 1: 365. 1936; Sprague, Jour. Bot. 74: 75. 1936; & Internat. Bot. Cong. 1930 Nomenclature Prop. Brit. Bot., 16–17, Art. 44. 1926, for discussion and examples.

[2] Internat. Rules Bot. Nomencl. ed. 3, Art. 61. 1935.

citing *T. ametrum* in synonymy, "type loc. seaward Coast Range." Evidently this was done under the misapprehension that *T. ametrum* was a new species rather than a new name.

VII. THE TYPE OF THE GENUS LEPIDOSPARTUM

Louis C. Wheeler

The type species of *Lepidospartum* A. Gray is *Lynosyris squamata* A. Gray since, when the genus *Lepidospartum* was described, this was the only species assigned to it. So far there is no problem. What specimen should be taken as the type of the species is, however, something of a puzzle. Gray had only two specimens at the time he described it. This is evidenced by the fact that there are in the Gray Herbarium only two sheets bearing respectively the names *Linosyris squamata* var. *Breweri* and *L. s.* var. *Palmeri;* all other sheets bear collection dates later than 1870, the year in which Gray described the two above varieties. To have designated two varieties from only two specimens leaves nothing as the type of the species according to our present ideas of proper typification. Gray himself seems to have given no hint of which element he considered the more typical. In no case that I can find did he reduce one variety to synonymy and maintain the other. In Syn. Fl. N. Am. **1**(**1**): 378. 1884, he abandoned both varieties simultaneously, concluding that they "are mere varying forms." Abrams, Bull. N. Y. Bot. Gard. **6**: 482. 1910 (Phyteographic & Taxonomic Study S. Calif. Trees & Shrubs), concludes that "We are therefore obliged to consider the Brewer plant as the type of the species, reducing the varietal name to synonymy." Evidently Abrams made his choice arbitrarily by priority of position as required by the now passé American Code. The International Rules provide that in the case of simultaneously published synonymous names, the author who first reduces one to a synonym of the other thereby determines which shall be used. This case of reduction by Abrams is unfortunately not quite parallel since he, idem, in his next sentence, reduced var. *Palmeri:* "The desert form, *Palmeri* does not seem distinct." It seems expedient to apply the unqualified specific name to the widespread entity. Therefore the Brewer specimen which represents this is taken as the type of the species *squamatum* which is the type of the genus *Lepidospartum.*

It is usual in modern monographic studies to designate by "var.

typica," or some similar non-transferable epithet, the typical variety (or other category ranking lower than specific) if one or more others are to be recognized. Here such a course is not open. The earliest varietal name for this entity is *Breweri* which is based on the type of the species *squamatum*. It is unfortunate that the Rules do not require either that "typica" be used to designate the typical entity or, perhaps better, that the specific epithet be repeated. The 1935 Rules, by inference from Recommendation 18, allow the use of any name to designate the typical entity in categories below specific rank. An absolute defect of the Rules is the unqualified requirement that the earliest available name as of that rank be used, This requires the use of many names designating the typical in lower-than-specific categories which are based on a type other than that of the species and which were intended to be different. Evidently this provision remains because of failure to correlate the type concept with the rules as to priority. The two are occasionally antagonistic. The priority rule should be modified to require the use of a name based on the same type as the species for any taxonomically identical subdivision of that species. Since this is not a monographic treatment and since a transfer might result in further nomenclatorial confusion I shall refrain from transferring the varietal epithet *Breweri* which is based on the type of the species.

The following key summarizes the differences between typical *Lepidospartum squamatum* and its var. *Palmeri:*

Phyllaries mostly extending little onto the peduncles and stopping abruptly without grading into the scaly leaves; scaly leaves discrete on fertile stems.....*Lepidospartum squamatum.*
Phyllaries extending well down (5–8 mm.) the peduncles and grading into the scaly leaves; scaly leaves crowded on fertile stems.....*L. s.* var. *Palmeri.*

LEPIDOSPARTUM SQUAMATUM (A. Gray) A. Gray in Proc. Am. Acad. **19**: 50. 1883, based on *Linosyris squamata* A. Gray, l. c., **8**: 290. 1870, no type designated, see above. *Carphephorus junceus* Bentham *sensu* Durand & Hilgard in Pacif. Rail. Rep. **5(3)**: 8. 1855. *Linosyris squamata* A. Gray var. *Breweri* A. Gray, Proc. Am. Acad. **8**: 290. 1870, TYPE: Low Hills of the Sierra Santa Monica, Los Angeles Co., California, *W. H. Brewer 71* (Gray Herb.). *Tetradymia squamata* (A. Gray) A. Gray, l. c., **9**: 207. 1874, *T. squamata* var. *Breweri* (A. Gray) A. Gray, Bot. Calif. 1: 408. 1876. *Baccharis sarothroides* A. Gray, var. *pluricephala* Jepson, Man. Fl. Pl. Calif., 1059. 1925;[1] type: Conchilla Mts., Piñon Well, Jepson 6008 (Herb. Jepson), not seen.

[1] **Date on title-page questionable but here accepted for convenience as no conflict as to priority is involved.**

Munz, Man. So. Calif. Bot., 576. 1935, included the last name, on Dr. S. F. Blake's advice, as a synonym. As I have not seen the type the name is included here in deference to Blake's judgment. Gray long ago commented on the strong resemblance between *Lepidospartum squamatum* and the sergilloid species of *Baccharis* which resemblance may explain Jepson's variety.

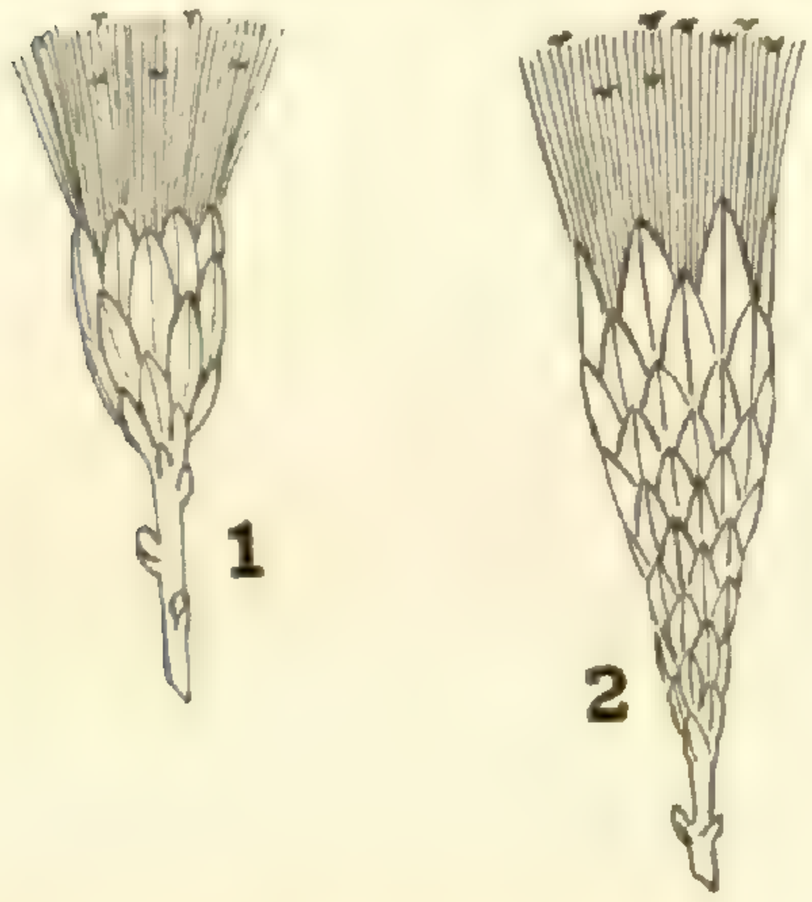

Fig. 1. Lepidospartum squamatum, head × 2. Drawn from *Duran 3367*, California (Herb. Gray). Fig. 2. Var. Palmeri, head × 2, boiled in water to show phyllaries in natural position. Drawn from the type.

According to Brewer's field-notes preserved at the Gray Herbarium his number 71 was collected Dec. 21, 1860, in "Sierra Santa Monica from camp 3 near the sea. 71. Composite shrub common everywhere on the low hills, but more so in the cañons, generally entirely out of flower." According to W. H. Brewer's itinerary given by F. P. Farquhar, Up and Down in Santa Monica Canyon (1.5 miles from sea beach). This elucidates the type locality.

Typical *Lepidospartum squamatum* has been reported from: California: southern Monterey Co.,[1] Tulare Co.,[2] Kern Co.,[1] Mohave & Colorado Deserts;[1] San Luis Obispo Co. to Lower Calif. and east to Arizona;[2] and Nevada.[3]

Lepidospartum squamatum (A. Gray) A. Gray var. **Palmeri** (A. Gray) comb. nov. *Linosyris squamata* var. *Palmeri* A. Gray in Proc. Am. Acad. **8**: 290. 1870, type: "Desert of the Colorado, Arizona," *Dr. E. Palmer* in 1870 (Gray Herb.).[4] *Tetradymia squamata* var. *Palmeri* A. Gray, Bot. Calif. **1**: 408. 1876, proposed without direct reference to *Linosyris squamata* var. *Palmeri* A. Gray but obviously identical. *Lepidospartum squamatum* var. *obtectum* Jepson, Man. Fl. Pl. Calif., 1159. 1925, type: Whitewater Wash, Riverside Co., Calif., *Schellenger*, (Herb. Jepson), not seen. Proposed without considering *Lepidospartum squamatum* var. *Palmeri*. Specimens seen: Califor-

[1] Jepson, Man. Fl. Pl. Calif., 1159. 1925.
[2] Hall, Univ. Calif. Pub. Bot. **3**: 222. 1907 (Comp. S. Calif.).
[3] Blake in Tidestrom, Contr. U. S. Nat. Herb. **25**: 605. 1925.
[4] The Colorado Desert is in California, not Arizona. It appears probable that the type was actually collected near Whitewater, Riverside Co., Calif., for the variety is local in that region and, according to the itinerary kindly supplied by Dr. Blake, Palmer traversed the Whitewater area in 1870 on his way from Arizona to Los Angeles, California.

NIA: Riverside Co.: Desert Wash, Whitewater Wash, 3 miles southeast of Palm Springs Station, Dec. 21, 1935, *L. S. Rose 35678* in part (Herb. Calif. Acad.) (The other part of this number is the typical variety. I believe that the two parts were taken from different plants. If they were not it would seem to invalidate the var. *Palmeri*). Morongo Creek, Riverside Co., alt. ca. 2,000 ft., Jan. 31, 1931, *Wheeler s. n.* (Herb. Wheeler). An intergrade between the species and var. *Palmeri* is: Sandy bed of wash in lower part of Morongo Canyon, n. Colorado Desert, alt. ca. 2,000 ft., Riverside Co., Aug. 1, 1927, *J. T. Howell 2905* (Herb. Calif. Acad.).

Variety *Palmeri* occupies a very restricted area in the northwest end of the arm of the Colorado Desert known as Coachella Valley and northward for several miles in the washes which drain into it.

There is another variant of *Lepidospartum squamatum*. Typically the mature stems of this species bear only reduced scaly leaves. Vigorous young shoots bear white-woolly fleshy leaves 1–2 cm. long. In Santa Anita Wash at Arcadia, and toward the east end of New York Ave., Altadena (both in Los Angeles Co., Calif.), the prevailing condition is for much of this usually juvenile foliage to be borne on mature branches. But the flowering branches on these generally have the ordinary scaly leaves. This race with persistent juvenile foliage is at least worth comment even if not nomenclatorial recognition.

(To be continued)

CONTRIBUTION FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXXII

(Concluded)

VIII. NEW SPECIES, VARIETIES AND TRANSFERS

M. L. Fernald

(Plates 497–507)

Recent studies of plants of various groups in eastern North America have necessitated the changes of some names and combinations and the description of several heretofore unrecognized spermatophytes. The illustration of many of the latter has been made possible through grants for research from the Division of Biology of Harvard University and through the photographic skill of Dr. E. C. Ogden or of my son, Henry G. Fernald.

Eragrostis trichodes (Nutt.) Nash., var. **pilifera** (Scheele), comb. nov. *E. pilifera* Scheele in Linnaea, xxii. 344 (1849).

Panicum (sub-§Scoparia) **recognitum**, sp. nov. (tab. 497, 498), planta cespitosa 0.6–1.5 m. alta; culmis firmis basi 2–3 mm. diametro, internodiis elongatis 6 vel 7, glabris; nodis plerumque glabris vel glabratis; foliis rosulatis basilaribus lanceolatis firmis glabris 3–3.5 cm. longis 5–9 mm. latis 40–54-nerviis; foliis caulinis primariis 5–7 lanceolatis firmis glabris acuminatis 0.6–1.3 dm. longis 0.8–1.5 cm. latis basi cordatis ciliatis, vaginis horizontaliter hirsutis vel glabratis pilis basi bullatis, ligulis obsoletis; paniculis primariis deinde exsertis ovoideis vel ellipsoideis 0.8–1.3 dm. longis 6–10 cm. diametro, rhachi glabro, ramibus patento-adscendentibus minute barbellatis, pulvinis pubescentibus, pedicellis elongatis barbellulatis; spiculis pubescentibus ellipsoideis basi apiceque obtusis 2.2–2.8 mm. longis 1.2 mm. latis,

gluma inferiore deltoideo-ovata acuta 0.8–1 mm. longa, superiore lemmateque sterile aequilongis valde costatis fructus lucidos subaequantibus; statu autumnali sparse ramoso, ramibus elongatis adscendentibus, paniculis terminalibus 1.5–5 cm. longis.—Southern New Jersey and southeastern Pennsylvania. NEW JERSEY: Camden County: headwaters of branch of Timber Creek, Albion, September 7, 1910, *Bayard Long*, nos. 4944, 4946, June 27, 1912, *Long*, nos. 7671 (TYPE in Gray Herb., ISOTYPE in Herb. Phil. Acad.), 7672, 7676, July 9, 1912, *Long*, nos. 7790, 7792, 7794; head of Beaver Brook, Lawnside, June 12, 1916, *Long*, no. 15,030; northwest tributary of Cooper Creek, Ashland, June 29, 1918, *Long*, no. 19,315. Ocean County: open sandy and grassy area, Waretown, July 10, 1915, *Long*, no. 13,006. Cape May County: swamp north of New England Creek, July 6, 1912, *O. H. Brown*, no. 59. PENNSYLVANIA: Kennett Square, Chester County, July 4, 1903, *W. Stone*, no. 5305; Lancaster County, July 9, 1904, *J. J. Carter*.

Panicum recognitum, for many years set apart in the herbarium of the Philadelphia Botanical Club as a strange species, was called to my attention by Mr. Long at the time we discovered *P. mundum* Fernald in RHODORA, xxxviii. 292, t. 443, figs. 1–5 (1936). Mr. Long has sent me for study a very full series, showing the plant in all stages of development. Its relationship is apparently with *P. mundum* and with *P. scabriusculum* Ell., both of which have, in well developed plants, more numerous primary leaves, these less cordate at base and with short but definite ligules. From *P. scabriusculum*, furthermore, *P. recognitum* is at once distinguished by shorter primary leaves, elongate autumnal branches with exserted panicles, copiously barbellulate panicle-branches with hairy pulvini, obtuse pubescent spikelets, elongate 1st glume and long grain. In fact, it cannot be confused with *P. scabriusculum*, although it is likely to be traced to that species in current keys. From *P. mundum*, which has similar branching and panicles, the latter with hairy pulvini, and the blunt spikelets pubescent, it is at once separated by its more cordate leaf-blade, the widely spreading pubescence of the sheaths, the glabrous culms and mostly glabrous or glabrate nodes, the barbellulate pedicels, the more ellipsoid and longer spikelet and longer 1st glume.

Superficially *Panicum recognitum* might suggest *P. boreale* Nash, but only very superficially. The more slender and much lower *P. boreale* has fewer and glabrous-sheathed thinner leaves, panicle-branches flexuous, spikelets more obovoid and only 2–2.2 mm. long, with short 1st glume. Specimens sometimes of a single collection,

have been placed by different students under such very different species as *P. sphaerocarpon*, *P. Clutei* and *P. clandestinum*, such contradictory identifications clearly indicating the difficulty met in properly placing *P. recognitum* by existing keys.

Altogether, *Panicum recognitum* seems to be another of the highly localized species of sub-§*Scoparia*, comparable in its extreme localization with *P. aculeatum* Hitchc. & Chase, *P. cryptanthum* Ashe and *P. mundum*. If it were common over southern New Jersey and adjacent Pennsylvania the acute field-botanists who are there raking every spot would have so found it.

ASARUM CANADENSE L., forma **Phelpsiae**, forma nov. (TAB. 499), foliis suborbicularibus vel rotundato-ovatis apice late rotundatis basi rotundatis sinu clauso.—NEW YORK: on limestone ledges, Gouverneur, September 4, 1915, *Orra Parker Phelps*, no. 1143 (TYPE in Gray Herb.).

Mrs. Phelps states that this remarkable plant grows with typical *A. canadense* at Gouverneur; also at a similar station in De Kalb; both in St. Lawrence County. Plate 499 shows a portion of the TYPE, × 1.

DROSERA INTERMEDIA Hayne, forma **corymbosa** (DC.), comb. nov. *D. intermedia*, β. *corymbosa* DC. Prodr. i. 318 (1824). Subvar. *corymbosa* (DC.) Rouy. Fl. de France, iv. 5 (1897).

AGRIMONIA STRIATA Michx., var. **campanulata**, var. nov. (TAB. 500, FIG. 1 et 2), foliolis ellipticis obtusis vel obtuse subacuminatis; hypanthio maturo campanulato basi rotundato 3–4 mm. longo 4–5 mm. lato, leviter costato.—Southwestern Colorado, New Mexico, Arizona and Mexico. The following are characteristic. COLORADO: moist north slope, alt. 7000 ft., Norwood Hill, San Miguel Co., August 17, 1912, *E. P. Walker*, no. 480. NEW MEXICO: Magollon Mts., Socorro Co., alt. 7500 ft., July 23, 1909, *O. B. Metcalfe*, no. 312. ARIZONA: Ramsey Canon, Huachuca Mts., September 29, 1929, *Marcus E. Jones*, no. 24,920 (TYPE in Gray Herb.); Upper Miller Canon, Huachuca Mts., August 14, 1909, *Goodding*, no. 405; Rincon Mts., September 20, 1909, alt. 7900 ft., *Blumer*, no. 3384; Barefoot Park, Chiricahua Mts., alt. 8000–8250 ft., September 9, 1907, *Blumer*, no. 1598; head of White River, White Mts., July 23, 1910, *Goodding*, no. 671. MEXICO: in the Sierra Madre, near Colonia Garcia, Chihuahua, August 28, 1899, *Townsend & Barber*, no. 290; City of Mexico, Federal District, October 9, 1898, *Holway*, no. 3235.

These specimens were mostly distributed as *Agrimonia Brittoniana* Bickn. (synonymous with *A. striata* Michx.) or as *A. Brittoniana*

occidentalis Bicknell. They were, perhaps, what the late Eugene P. Bicknell had in mind when he first applied the name *A. Brittoniana occidentalis* in the herbarium. But that name has no clear status. It was published as a *nomen nudum* for any *Agrimonia* occurring "from S. D. and Wyo. to N. M. and Ariz.," by Rydberg in his Flora of Colorado (Agr. Expt. Sta. Col. Agr. Coll., Bull. 100), 189 (1906). It had absolutely no descriptive word and the name, consequently, has no status. Even Rydberg himself, in his treatment of *Agrimonia* in the North American Flora, xxii[5]. 391–396 (1913), failed to mention it, but he mistook extreme plants of *A. striata*, var. *campanulata* for the northeastern and Californian *A. gryposepala* Wallr. He so identified Holway's material from Mexico City and he doubtless included the extreme New Mexican plants with it, giving the range for *A. gryposepala* "Nova Scotia to North Carolina, Nebraska, and North Dakota; apparently also California, New Mexico and Mexico" (l. c. 292). Except for the series from the Pacific slope (southern British Columbia to California), there is no indication in the Gray Herbarium of *A. gryposepala* from west and southwest of eastern Nebraska and Missouri.

Var. *campanulata* differs from typical transcontinental *Agrimonia striata* in its thinner and blunter leaflets (those of typical *A. striata* being usually firm, more or less canescent beneath, with long-acuminate to acute tips) and its round-based and broad fruiting hypanthium (FIG. 2); the ripe hypanthium in typical *A. striata* (FIG. 3) being cuneately turbinate, 3–4.5 mm. broad at summit and very deeply furrowed, whence the name. It occurs from Newfoundland to British Columbia and southward, in the West following the Rocky Mountains in typical form to Wyoming, with specimens clearly transitional to var. *campanulata* from as far south as New Mexico and Arizona.

POLYGALA VERTICILLATA L., var. **isocycla**, var. nov. (TAB. 501, FIG. 2 et 3), planta 0.5–2 dm. alta, plerumque ramosa, ramibus divergentibus vel oblique adscendentibus; foliis lanceolatis vel lanceolato-linearibus submembranaceis plerumque verticillatis, verticillis 3–7-foliatis; pedunculis 0.5–4 cm. longis; racemis densis lanceolato-cylindricis vel lanceolato-conicis apice attenuatis, parte florifero 0.5–1.2 cm. longo, viridiscentibus vel albidis; pedicellis 0.1–0.3 mm. longis; capsulis 1–1.6 mm. longis. *P. verticillata* sensu Pennell in Bartonia, no. 13: 9, pl. 2 (1932), not L., as to TYPE.—Dry or moist sterile open habitats, Massachusetts to southern Manitoba, south to

Florida, Alabama, Louisiana and Texas. TYPE: sandy field, Frazer, Chester Co., Pennsylvania, August 7, 1910, *E. B. Bartram*, no. 1124 (in Gray Herb.).

As noted, var. *isocycla* is the extreme of the polymorphous *Polygala verticillata* which Pennell treats as typical *P. verticillata* L. Sp. Pl. 706 (1753); whereas the plant (our FIG. 1) which Linnaeus indubitably had before him in preparing his own original *new* diagnoses in Species Plantarum, 706 (1753), which he personally marked "*verticillata*," and which in its technical details clearly matches his exact new diagnoses, is the ascending-branched and mostly taller plant with fewer and narrower leaves (3–5) in a whorl, the upper and frequently all but the lowest mostly scattered, the peduncles commonly long, the white to purplish racemes rather lax, the floriferous portion (after falling of basal fruits) 1–2 cm. long, the pedicels 0.5–2 mm. long, the seeds with slightly longer pubescence. The latter, which is the plant accurately described by Linnaeus from the material in his own herbarium, is *P. Pretzii* Pennell, l. c. 12, pl. 3, fig. 1 (1932).

Our nomenclature, most fortunately, does not reach back of 1753, and the typification of names obviously should stop there, except in those cases where Linnaeus based his species and other groups *solely* on specimens and diagnoses of earlier date. Whenever in 1753 Linnaeus had before him and clearly designated in his own herbarium a recognizable specimen and when he gave an original diagnosis which closely matches it, the references to earlier works should be treated as of minor importance if our taxonomy and nomenclature are to rest on the most secure bases possible. Otherwise, if the less clear and often quite confused writings prior to 1753 are given preference, we enter needlessly debatable and always unsatisfactory ground and taxonomy and nomenclature become unnecessarily obscure at points where they should be perfectly clear. The older diagnoses quoted by Linnaeus, as Dr. Pennell definitely shows, pertained to different entities, which he recognizes as species but which Gray, Blake (N. Am. Fl.) and most others have considered merely varieties of one variable species; and Dr. Pennell learnedly discusses the possible applications of the earlier polynomials. As studies in ancient history such speculations may be interesting but the deductions from them are needless and, as experience shows, where they are merely deductions they are exceedingly liable to error and they are too often prejudicial to the result where Linnaeus in 1753 gave a new and original account of his species

based upon actual specimens before him; only the latter is then really important. Pennell recognized that the plant in the Linnaean herbarium has some significance, saying:

"But still a further complication is introduced by the fact that by 1753 Linné had acquired for his herbarium the single specimen placed by him under this name; this came from Kalm, who collected in Pennsylvania and northward, and it was the second species of the key, named above *P. pretzii*. A plea might be made that it should be accounted the basis of *Polygala verticillata*, but against this is the fact that Kalm's plants were received so late as often to have had little influence on Linné's decisions and especially the further fact that it does not so well fit the Linnean diagnosis as does the first species of our key; the latter shows more perfectly the verticillate phyllotaxis and much better the remote disposition of the racemes."[1]

In order to be quite clear as to Pennell's interpretation it is wise to copy from his key-characters and descriptions of his *P. verticillata* (our var. *isocycla*) and his *P. Pretzii* (*P. verticillata* of L. herb.) the phrases describing the features he discusses:

1. P. VERTICILLATA sensu Pennell. Raceme slender, *dense* and conic, the sepals greenish-white; leaves all in whorls of 3–7, only the uppermost occasionally opposite or scattered; plant "1–2" (or "1–3") dm. tall, with widely spreading branches and the racemes on peduncles 0.5–4 cm. long.

[1] Pennell's argument, that "Kalm's plants were received so late as often to have had little influence on Linné's decisions," is at least novel. It is also difficult to reconcile with the well known fact, that Kalm came to America at the instigation of his teacher, Linnaeus, who, on October 23, 1747, wrote to Adalbert von Haller; "Kalm is lately gone to England, from whence he will proceed to Canada, in order to collect seeds for the Upsal garden, as the plants of that country bear our winters perfectly well. He is a pupil of mine, and has just been appointed oeconomical professor at Abo, in consequence of my recommendation"—J. E. Smith, Sel. Corr. Linnaeus, ii. 417 (1821). In August, 1748, Linnaeus again expressed keen interest in Kalm's enterprise, writing to John Mitchell, "I hope his journey will be prosperous. I have rendered him every service in my power." (Smith, l. c. 446). In the winter of 1750–51 Kalm started home to Sweden and, on February 1, Cadwallader Colden wrote to Linnaeus from his estate in New York of having sent to him by Kalm some notes on American plants (Smith, l. c. 457); and Kalm himself, during his American travels, had taken every opportunity to transmit detailed accounts of his discoveries, sent "*a Monsieur Charles Linnaeus Premier Medecin du Roy et Professeur en Medicine et Botanique d'Upsal*" or "*To The Secretaire of the Swedish Royal Society of Sciences in Upsal in Sweden, Master Charles Linnaeus.*" From Kalm, returned to Sweden, Linnaeus received detailed letters, written from Stockholm and sent to Upsala, beginning in May, 1751, and continuing for some years. These letters are full of details regarding "Pennsylvanien, Nya Yersey, Nya York och Nya England" and regarding the plants which Kalm had carried back to Sweden. (See especially J. M. Hulth, Bref och Skrifoelser af och till Carl von Linné, viii.[1] 1–118 (1922), these pages being the letters from Kalm to Linnaeus). Linnaeus had Kalm's collections at least two full years before the publication of *Species Plantarum*. Those who believe that he was not profoundly interested in them and that they "had little influence on Linné's decisions" have an original and difficult thesis to defend. If Kalm's material was of so little significance, it is singular that many species were based solely upon his plants.

2. P. Pretzii Pennell (*P. verticillata* L. herb.). Raceme *looser;* the sepals white or somewhat pinkish; leaves in whorls of 3–5, the upper or sometimes nearly all scattered; plant usually 2–3 dm. tall, with ascending branches and the racemes on peduncles 2–7 cm. long.

Pennell lays much stress on the more generally verticillate leaves of his no. 1, as meaning to him that Linnaeus really intended that plant with "dense" racemes of greenish-white flowers. He also feels that the plant which Linnaeus had in his own herbarium and ticketed "*verticillata*" (Pennell's no. 2), "does not so well fit the Linnean diagnosis as does the first species of our key; the latter shows more perfectly the verticillate phyllotaxis and much better the remote disposition of the racemes."

Linnaeus had two brand new or original (unquoted) diagnoses for his *P. verticillata.* The first was taken over largely from that of his pupil, Jonas Kiernander (1751), but with most significant differences. Kiernander's diagnosis had been: "POLYGALA floribus imberbibus spicatis, caule erecto herbaceo filiformi ramoso, foliis linearibus;[1] but in his own description, in 1753 (the first diagnosis which absolutely concerns us), Linnaeus added the facts that the leaves are *verticillate,* as they are in either 1 or 2 of Pennell, and the flowers *remote* in the spike ("spicis floribus remotis", which Pennell, most unfortunately, renders "the remote disposition of the racemes"). From his mistranslation of this diagnosis Pennell deduces that Linnaeus meant the plant with racemes "dense" and "conic," not the one with them "looser." The second and wholly new diagnosis of Linnaeus read "Folia *saepius quina ad genicula, interdum alterna.* Spicae *albae, angustissimae flosculis remotis,*" which, rendered into English, would be: "leaves frequently 5 to a node, sometimes alternate; spikes white, very slender, with the flowers remote." In view of the fact that Linnaeus had, two years before the publication of this new and clear diagnosis, received the American collections of his student Kalm, who had gone to America at Linnaeus's instigation, and had placed in his own herbarium a couple of Kalm's plants which he labeled "*verticillata*" (see our FIG. 1), there should be no serious doubt that this material, accurately displaying the several points in the second and wholly new diagnosis of Linnaeus, should stand as the TYPE of his *Polygala verticillata.* The arguments that by "Folia *saepius quina ad genicula, interdum alterna*" Linnaeus intended to say "Leaves all in

[1] Kiernander in L. Amoen. Acad. ii. 139 (1751).

whorls of 3 to 7, only the uppermost occasionally opposite or scattered" and that by his "Spicae *albae*, *angustissimae flosculis remotis*" he really meant "Racemes [spikes] dense" and "conic," with "greenish-white" sepals, are unconvincing.

Polygala verticillata, var. *isocycla* (FIGS. 2 and 3) might be considered inseparable from var. *sphenostachya* Pennell in Bartonia, no. 13: 12 (1932) (our FIG. 4). Treating as *P. verticillata* (typical) the plant I am calling var. *isocycla*, with "Capsule 0.9–1.2 mm. long," his var. *sphenostachya* was defined "Floribus et fructibus majoribus diversa," which in the key on the preceding page was clarified: "Capsule about 1.5 mm. long; plants usually 1.5–3 dm. tall." A fine sheet of isotypes (*Bush*, no. 7692) of var. *sphenostachya* is in the Gray Herbarium. Its capsules are not well developed, the racemes being relatively young, but the most mature capsules, when checked by a thin and finely divided metal measure show lengths of 2–2.3 mm. (FIG. 4). Dr. S. F. Blake writes me that the TYPE in the National Herbarium likewise "has fruits measuring 2–2.3 mm. long." Similarly, a considerable series, occurring in the Mississippi Basin and adjacent areas, shows capsules of like size. These plants with large capsules (much larger than originally defined) are var. *sphenostachya*, because of the cited type. Var. *isocycla* is more wide-ranging, and occurs on the Atlantic slope as well as westward. It is smaller in general than var. *sphenostachya* and its capsules (FIG. 3) are 1–1.6 mm. long, the largest ones reaching the measurements of the smallest in var. *sphenostachya*. Such transitional specimens are, naturally, difficult to pigeon-hole.

NYMPHOIDES **cordatum** (Ell.), comb. nov. *Villarsia cordata* Ell., Sk. Bot. S. C. and Ga. i. 230 (1816 or '17). *V. lacunosa* sensu Eaton Man. Bot. No. Mid. States, ed. 2, pt. 2: 492 (1818); sensu Torr. Fl. No. Mid. U. S. i. 215 (1824); sensu Bigel. Fl. Bost. ed. 2: 78 (1824); and later authors, not Ventenat, Choix des Plantes, 9 (1803). *Limnanthemum lacunosum*, α. Griseb. Gen. Sp. Gent. 47 (1839), as to plant described, not as to source of specific epithet. *N. lacunosum* Fernald in RHODORA, x. 54 (1908), as to plant, not as to source of specific epithet.

We have two native species of *Nymphoides:* one a small plant, ranging from Florida and Louisiana northward to southeastern Canada and Newfoundland, known in recent works as *N. lacunosum* or *Limnanthemum lacunosum;* the other much coarser, occurring from Florida to Texas, and northward on the coastal plain to Delaware and southern

New Jersey, known, correctly, as *N. aquaticum* (Walt.) Ktze. The two are distinguished as follows:

N. CORDATUM (N. LACUNOSUM of recent authors). Floating leaves with filiform smooth petioles, the cordate-ovate blades 1.5–5 cm. broad, often mottled or variegated above, scarcely or only minutely pitted beneath; spur-roots frequent; calyx 3–5 mm. long; corolla 0.5–1 cm. broad; capsule ovoid-subglobose, 3–5 mm. long; seeds smooth.

N. AQUATICUM. Floating leaves with cord-like often purple-glandular petioles, the suborbicular to reniform thick blades 0.4–1.5 dm. broad, usually green above, abundantly and coarsely vesicular and pitted beneath; spur-roots less frequent; calyx 4–8 mm. long; corolla 1–2 cm. broad; capsule elongate, 6–9 mm. long; seeds glandular-roughened.

The first North American species defined was *Anonymos aquatica* Walt. Fl. Carol. 109 (1788), clearly described "foliis peltato-reniformibus, coriaceis, subtus punctatis," etc. It was also described as *Menyanthes trachysperma* Michx. Fl. Bor.-Am. i. 126 (1803): "M. habitu nymphoideo . . . seminibus vesiculis ovatulo-oblongis conspicue scabris." There is no question as to the plants of Walter and of Michaux; and Michaux cited *Villarsia aquatica* (Walt.) Gmel. as the same as his *Menyanthes trachysperma*, giving a new name descriptive of the characteristic seeds.

No distinction was noted by the northern botanists, Eaton, Torrey, Bigelow and others of their period, because they knew only the slender and small northern species; and when Grisebach treated the genus he created a confusion which every one has followed, although in 1912, in a foot-note, Dr. Witmer Stone[1] noted the error involved. Considering both our plants as constituting one species with two varieties, Grisebach, l. c., called the small plant *Limnanthemum lacunosum*, α., with the synonym, derived from an herbarium-name, *Menyanthes punctata* Muhl.; the larger plant, *L. lacunosum*, β. *australe*, "magnitudo decies major, lacunis quoque majoribus," with *Anonymos aquatica* Walt., *Villarsia aquatica* (Walt.) Gmel. and *Menyanthes trachysperma* Michx. cited as belonging to it. Most singularly, Grisebach cited *Villarsia lacunosa* Ventenat as belonging to his var. α., not to his var. β.; and Gray, Britton and most others have faithfully followed Grisebach's erroneous course as to the identity of *Villarsia lacunosa*. Furthermore, northern botanists, familiar with the lake- or pond-habitat of the small species, have forced the Latin name into signifying the habitat.

Ventenat, however, as pointed out by Stone, was simply giving to

[1] Stone, Pl. So. N. J. 644 (1912).

the large southern plant a new specific name, a substitute for those already given it; and the new and quite *illegitimate* name was in recognition of the superabundant pits (lacunae) in the lower leaf-surface! Here is Ventenat's treatment:

"Le genre Villarsia comprend les espèces suivantes:

. . . . . .

V. lacunosa (Anonymos *aquatica*, Walther, *Flor. Carolin.* Villarsia *aquatica* (2). Gmel. *Syst. Veget.* et Bosc, *Bullet. de la Soc. Philom.*) Foliis reniformibus, subpeltatis, subtus lacunosis, natantibus; petiolis floriferis; corollis glabris."[1]

That *Villarsia lacunosa* Vent. was merely the coarse southern plant is sufficiently evident. Surely the name did not apply to the slender and usually more northern species nor can it be used for any species, being merely a substitute or illegitimate name.

Stephen Elliott clearly understood the two plants. The coarse southern species he called *Villarsia trachysperma*, based on *Menyanthes trachysperma* Michx., with Walter's *Anonymos aquatica* as a synonym, and described: "*Leaves* . . . frequently orbicular, 3–4 inches in diameter, . . . underneath . . . covered with vesicular points. *Petioles* . . . dotted, sometimes roughened . . . Flowers June."[2] The slender plant was beautifully described by him as *Villarsia*

"1. Cordata. E.

V. foliis cordatis, integerrimis; petiolis floriferis. E.	Leaves cordate, very entire; petioles bearing the flowers.
Grows in shallow streams. *Petioles* about an inch long, exactly cordate, variegated.	. . . slender, glabrous. *Leaves*

Flowers July–September."

A fragment of Elliott's type, long ago secured by Asa Gray, is wholly characteristic.

Treating the small-leaved and slender plant as *Limnanthemum lacunosum* (following Grisebach), Gray gave in the synonymy in the Synoptical Flora Elliott's name, saying "*V*[*illarsia*] *cordata*, Ell. Sk. i. 230, a fitter name." Not only is it "a fitter name"; so far as I have found, it is the only name that fits.

Halenia deflexa (Sm.) Griseb., forma **heterantha** (Griseb.), comb. nov. *H. heterantha* Griseb. Gen. Sp. Gent. 325 (1839). *H. deflexa*, var. *heterantha* (Griseb.) Fern. in Rhodora, i. 37 (1899).

[1] Vent. Choix des Plantes, 9 (1803).

[2] Ell. Sk. Bot. S. C. and Ga. i. 230 (1816 or '17)

Although spurless flowers frequently occur late in the season on plants which early produced spurred corollas, the spurless flowers often are the only ones produced. Forma *heterantha* is, then, a peculiarly interesting reversionary form.

HYDROPHYLLUM VIRGINIANUM L., forma **simplicifolium**, f. nov. (TAB. 502), foliis simplicibus laminis 4–9 cm. longis lobis obtusis; calicibus 3–4 mm. longis; corollis 5–6 mm. longis lobis angustis.—VERMONT: rich woods, Charlotte, June 6, 1879, *Pringle* (TYPE in Gray Herb.).

The extraordinary plant shown in plate 502, × 2/5, was labelled by the late Sereno Watson as an unpublished new species. Its publication was stopped by a letter coming from Pringle, stating that search through the area showed that no fruit was set and that in some cases forma *simplicifolium* was springing from rhizomes which likewise bore the typical large-flowered and large- and pinnate-leaved *Hydrophyllum virginianum*. This letter of Pringle's suggests that forma *simplicifolium* is a root-sport. It is so remarkable that it would be of great interest to rediscover it.

HACKELIA **americana** (Gray), comb. nov. (PLATE 503). *Echinospermum deflexum*, var. *americanum* Gray in Proc. Am. Acad. xvii. 224 (1882). *Lappula deflexa*, var. *americana* (Gray) Greene, Pittonia, ii. 183 (1891). *L. americana* (Gray) Rydberg in Bull. Torr. Bot. Cl. xxiv. 294 (1897). *Hackelia deflexa* sensu I. M. Johnston in Contrib. Gray Herb. n. s. lxviii. 45 (1923), as to North American plant, not (Wahlenb.) Opiz. *H. deflexa*, var. *americana* (Gray) Fernald & Johnston in Fernald in RHODORA, xxvi. 124 (1924).

Although all students of the *Boraginaceae*, except Rydberg, have treated the plant of calcareous slopes and bluffs, which occurs from the Gaspé Peninsula, Quebec to southern British Columbia, south interruptedly to northern New Brunswick, northern Vermont, the Bruce Peninsula, Ontario, northern Michigan, Wisconsin, Iowa, Nebraska, Montana, Idaho and Washington, as conspecific with the Eurasian *Hackelia deflexa* (Wahlenb.) Opiz (PLATE 504) (or *Myosotis deflexa* Wahlenb., *Echinospermum deflexum* (Wahlenb.) Lehm., *Lappula deflexa* (Wahlenb.) Roth), there are several very marked characters which separate them.

Gray's original account, under *Echinospermum*, was as follows:

"E. DEFLEXUM, Lehm. Nutlets only marginally glochidiate, with the dorsal disk minutely scabrous: in var. AMERICANUM (which makes some approach to *E. Virginicum*) the somewhat more granulate dorsal disk

not rarely bears two or three small glochidiate prickles on an obscure mid-nerve!"

Gray had four specimens before him: Clinton County, Iowa, *Geo. D. Butler:* Lake Winnipeg, *Bourgeau:* Saskatchewan, *Bourgeau:* West Kootenay, *Lyall.* The Bourgeau sheet from Saskatchewan alone bears Gray's varietal name in his hand and the pocketed fruits with his memoranda; it should stand as the TYPE. The character used by Gray is wholly variable; consequently, in revising the material in the Gray Herbarium in 1915, Mr. J. Francis Macbride ticketed it all *Lappula deflexa.* These revision-labels of Macbride's have superimposed upon them those of Dr. I. M. Johnston in 1923, agreeing as to identity, but calling the plant *Hackelia deflexa,* an unequivocal reduction of the American plant to the species of eastern Europe and Asia maintained in Johnston's detailed *Restoration of the Genus Hackelia*—Contrib. Gray Herb. n. s. lxviii. 45 (1923). Very familiar with the American plant as it occurs on the limy talus and bluffs of Gaspé, I could not feel that its broader and more acuminate leaves and the narrower and straight-edged deltoid nutlets indicated exact identity with the Eurasian plant with narrow leaves and more ovate nutlets. I consequently induced Dr. Johnston in 1924 to join me in reviving var. *americana* under *H. deflexa.*

Now, however, faced with the necessity of reviewing the situation in rewriting Gray's Manual, I find so many differences that I am unable to unite the Old World *Hackelia deflexa* and the American *H. americana* and in the Gray Herbarium am superimposing a third revision-slip on the two already there! Briefly the differences are these:

H. DEFLEXA (PLATE 504, FIGS. 1–7). Cauline leaves linear-lanceolate to narrowly oblanceolate, obtuse or merely acute, 0.25–2 cm. broad; racemes with some flowers usually supraaxillary (FIGS. 1–3), the mature pedicels mostly 0.5–2.5 cm. apart; bracts (FIGS. 1–3) of the ascending racemes well developed, the lower and usually all with dilated obtuse or merely acutish blades; expanded corollas (FIG. 4) 3–6 mm. broad; mature fruit (FIGS. 5–7) with nutlets intact and, including glochidia, 4–6 mm. long; open back of mature nutlet (FIGS. 5–7) ovate, 1.5–2 mm. broad, with blunt pebbling and with an elevated wing-margin formed by the fused lanceolate flat bases of the glochidia.

H. AMERICANA (PLATE 503). Cauline leaves elliptic-lanceolate to narrowly elliptic-ovate, mostly acuminate, the principal ones 0.5–3 cm. broad; flowers mostly approximate to their bracts (FIGS. 1, 3 and 4), the mature pedicels 3–10 (rarely –20) mm. apart; bracts (FIGS. 1, 3 and 4) of the less ascending racemes poorly developed, the lowest with lance-acuminate blades, all the others greatly reduced and inconspicuous,

linear-attenuate; expanded corollas (FIG. 2) 1.5–3 mm. broad; mature fruit (FIGS. 5 and 6) including glochidia, 3–4.8 mm. long; open back of mature nutlet narrowly deltoid-ovate, 1–1.5 mm. broad, muriculate-pebbled, the marginal glochidia mostly distinct and linear-subulate.

In the plates illustrating details of the two species the habit is shown, × 1; the portions of inflorescence showing bracts and pedicels, × 1; details of flowers, × 4 and fruits, × 8. In *Hackelia americana* the calyx has fine and less rigid strigose pubescence than in *H. deflexa;* and the backs of the nutlets are more generally hispid than in *H. deflexa.* The latter character is too variable, however, to be emphasized, as is the tendency in *H. americana* sometimes to bear a few glochidia (FIG. 6) on the back of the nutlet. When these occur *H. americana* somewhat suggests *H. virginiana* (L.) I. M. Johnston. The latter has foliage similar to that of *H. americana* but larger, and its flowers are nearly as small and its racemes similarly bracted; but in *H. virginiana* the short-pediceled fruits (PLATE 504, FIG. 8) are subglobose and the ovate backs of the nutlets are almost hidden by the abundant glochidia.

I am taking up *Hackelia* Opiz for the species with deflexed pedicels which have long been included under *Lappula.* This I do in deference to the vastly superior knowledge of generic lines in the *Boraginaceae* of Dr. Johnston. In his *Restoration of the Genus Hackelia,* already referred to, he gave the generic distinctions as follows:

"LAPPULA. Annual; inflorescence abundantly bracteate; pedicels erect; gynobase subulate, 5–10 times as tall as broad, about equaling the nutlets; style surpassing the nutlets; nutlets narrowly attached all along the well developed medial ventral keel.

HACKELIA. Biennial or perennial; inflorescence naked or rarely sparsely bracteate; pedicels recurved or deflexed in fruit; gynobase pyramidal, less tall than broad; style definitely surpassed by nutlets; nutlets attached by a large oblique submedial ovate or deltoid areola; ventral keel extending over only upper half of nutlet."

The characters of the fruit and the gynobase are, I take it, constant; so, apparently, is the duration of the plants. The type of *Hackelia, H. deflexa,* has a bract opposite or alternating with many or all flowers; so have the two species of Atlantic North America above noted. As a fundamental generic character the *lack* of bracts is not well displayed in these three species. It is likewise significant that in 1924, in a synopsis of the American species of *Lappula,* which in 1923 had as one of its generic distinctions "style surpassing the nutlets", the monographer should have used as a key-character

separating *L. brachystyla* from *L. Redowskii* "Style exceeded by nutlets" in the former, opposed to "Style surpassing nutlets" in the latter.

ERIGERON ELATUS Greene, var. **oligocephalus** (Fern. & Wieg.), comb. nov. *E. acris*, var. *oligocephalus* Fern. & Wieg. in RHODORA, xii. 226 (1910) as to TYPE, *Fernald & Wiegand*, no. 4138. PLATE 505, FIGS. 1 and 2.

The species of *Erigeron* § *Trimorphaea* (Cass.) DC. are as baffling as any in the genus. In temperate eastern North America the section is represented by the quite characteristic *E. lonchophyllus* Hook. (*E. armerifolius* Turcz.) on Anticosti, the Mingan Islands and adjacent mainland of Saguenay County, Quebec, there isolated from the West, and the three very characteristic plants which have passed as *E. acris* L. and varieties of it. Typical *E. acris* of Europe (extending across Asia) does not seem to occur in North America. Habitally somewhat like the Eurasian and North American plant which has erroneously passed as *E. acris* (or as its var. *droebachensis* (O. F. Muell.) Blytt or var. *asteroides* (Andrz.) DC.), it has nonglandular peduncles and involucres, the latter coarsely hispid (FIG. 5). The wide-ranging plant which crosses North America has glandular-pruinose peduncles (FIG. 4) and the involucral bracts essentially glabrous except for glandularity or viscidity. This is *E. elongatus* Ledeb. Ic. Fl. Alt. i. 9, t. 31 (1829) which was more fully described by Ledebour in Fl. Alt. iv. 91 (1833). It is also, perhaps, *E. droebachensis* O. F. Mueller in Fl. Dan. v. fasc. xv. t. dcccIxiv (1782), which was published in a largely polynomial work and which did not receive validation, apparently, until taken up by Fries, Summ. Veg. Scand. 183 (1846). The exact application of the name *E. droebachensis* is open to doubt, several Scandinavian authors placing it with *E. acris*, others (Lindman, for instance) indicating it as a mixture. Our plant is likewise, apparently, the one treated by DeCandolle, Prodr. v. 290 (1836) as *E. acris*, var. *asteroides*, based on the doubtful *E. asteroides* Andrz. The first name for this plant which is wholly free from doubt and the one used by Lindman, Hultén and other progressive students of boreal floras is *E. elongatus* Ledeb. Later names are *E. yellowstonensis* A. Nels. in Bot. Gaz. xxx. 198 (1900) and *E. lapiluteus* A. Nels. in Coult. & Nels. Man. Bot. Rocky Mts. 530 (1909). In the Rocky Mountains *E. elongatus* sometimes has hispid peduncles and involucres; consequently Gray took it to be true *E. acris* and under the latter name he

included specimens of all the plants here considered, even including *E. lonchophyllus*. All these Rocky Mountain specimens which I have seen, however, of the tall and stiff plant have the pruinose-glandular peduncles and bracts, the glands somewhat hidden by the long trichomes. To me it seems to be merely an extreme of *E. elongatus*.

Erigeron elatus Greene, Pittonia, iii. 164 (1897), said to be *E. alpinus*, var. *elatus* Hook. Fl. Bor.-Am. ii. 18 (1834), was given a full description by Greene. Its stems "bearing at summit either a solitary rather large head, or 3 to 5, which are slender-peduncled and subcorymbose . . . involucres 4 or 5 lines high and 6 in breadth, bracts linear-acuminate, almost hispidly short-hirsute, not glandular, unequal, the outer little more than half the length of the inner" show that Greene was describing, as he said, a plant "common in the mountains of British Columbia, where Mr. Macoun has repeatedly collected it." Plants sent out by Macoun as *E. elatus* and similar ones of earlier date are exactly the plant called by me *E. acris*, var. *arcuans* in RHODORA, xxviii. 236 (1926). A characteristic involucre, × 2, is shown in FIG. 3.

As I see it, we must accept *Erigeron elatus* as the plant clearly defined by Greene, although he drew his name from *E. alpinus*, var. *elatus* Hook. Fl. Bor.-Am., for there is absolutely nothing in Hooker's account to show what he had. *E. alpinus* is a very definite European species not represented with us, except by *E. borealis* (Vierh.) Simmons in arctic America; and it differs from all representatives of *E. acris* in having double, instead of single pappus. Hooker, misidentifying something as *E. alpinus*, had a var. β. without name, and "γ. *elata;* subpedalis." Surely the mere statement of height, without any other character, is not enough; at best *E. alpinus*, var. γ. *elatus* Hook. was a *nomen subnudum*. It so happens that Hooker gave to Asa Gray as his var. γ. *elatus* a specimen which is not the small-headed plant described by Greene. It seems to be the large-headed extreme which is represented by the type of *E. acris*, var. *oligocephalus* Fern. & Wieg. In view of Greene's clear and unusually careful definition of the smaller-headed extreme of *E. elatus* and Hooker's quite undistinguishing word under his *E. alpinus*, var. γ. *elatus*, it would be pushing the type-concept to its utmost absurdity to say that Greene's *E. elatus* is not the plant he accurately described, because, without more than wrongly guessing as to the identity of Hooker's plant, he cited the latter. I, therefore, maintain *E. elatus* Greene for

the plant he described, treating the seeming source of the name, *E. alpinus*, var. γ. *elatus* Hooker, as inadequately defined and, therefore, not adequately published. Doubtless some extremely literal botanists will view the matter differently!

As I just now interpret the representatives of *Erigeron* § *Trimorphaea* ("just now" because any treatment is unsatisfactory and tentative) in temperate eastern North America, they may be distinguished by the following key.

a. Peduncles glandular-pruinose or viscid; involucral bracts glabrous or nearly so, glandular or viscid; inflorescence an elongate raceme or thyrsiform to corymbiform panicle of (4–)7–80 heads on stiffly spreading-ascending peduncles; involucres 5–8 mm. high; stems 2–8 dm. high. . . . . 1. *E. elongatus.*

a. Summits of peduncles and involucral bracts copiously hispid or villous, glandless; stems 0.2–4.5 dm. high. . . . *b.*

b. Cauline leaves narrowly linear; heads 1–70, on erect peduncles; no filiform pistillate flowers between the marginal ligulate and the perfect central flowers.

Stems 1–4.5 dm. high; leaves scattered up the stem into the inflorescence; some of the 3–70 peduncles in the axils overtopped by the leaves. . . . . 2. *E. lonchophyllus.*

Stems 0.2–1.3 dm. high; leaves crowded at base, the cauline reduced to tiny linear bracts; heads 1 or 2 (rarely 3), terminating the scapiform stem

2a. *E. lonchophyllus*, var. *laurentianus.*

b. Cauline leaves linear-oblong, lanceolate or oblanceolate; heads 1–8, on elongate flexuous or arching peduncles; filiform pistillate flowers forming a ring between the ligulate and the perfect tubular central flowers.

Involucres 5–9 mm. high, of 20–36 bracts, the outer bracts ½–nearly equaling the inner; disks of leading heads 0.8–1.5 cm. broad. . . . . 3. *E. elatus.*

Involucres 7–12 mm. high, of 36–60 bracts, the outer mostly about equaling the inner; disks of leading heads 1.5–2 cm. broad. . . . . 3a. *E. elatus*, var. *oligocephalus.*

1. E. ELONGATUS Ledeb. Ic. Fl. Alt. i. 9, t. 31 (1829). *E. drocbachensis* sensu Am. botanists, perhaps not *E. drocbachensis* O. F. Muell. in Fl. Dan. v. fasc. xv. t. dcccIxiv (1782), chance binomial in polynomial volume, validated by Fries, Summ. Veg. Scand. 183 (1846). *E. glabratus* Hook. Fl. Bor.-Am. ii. 18 (1834), not Hoppe. *E. acris*, var. *asteroides* sensu DC. Prodr. v. 290 (1836), based on the doubtful *E. asteroides* Andrz. *E. acris* and var. *drocbachensis* at least in sense of Gray, Syn. Fl. N. Am. i². 219, 220 (1884). *E. yellowstonensis* A. Nels. in Bot. Gaz. xxx. 198 (1900). *E. lapiluteus* A. Nels. in Coult. & Nels. Man. Bot. Rocky Mts. 530 (1909).—Damp banks, open sands, thickets and clearings, Hamilton River, Labrador Peninsula to Alaska, south to Anticosti Island and Gaspé Peninsula, Quebec, northern New Brunswick, northern Maine, northern Michigan, Manitoba, Saskatchewan, Colorado, Utah and Oregon; northern Eurasia.—An involucre, × 2, is shown in FIG. 4.

2. E. LONCHOPHYLLUS Hook. Fl. Bor.-Am. ii. 18 (1834). *E. armerifolius* Turcz. ex DC. Prodr. v. 291 (1836); *E. armeriaefolius* Gray in Proc. Am. Acad. viii. 648 (1873) and Syn. Fl. N. Am. i^2. 220 (1884), change of spelling. *E. racemosus* Nutt. Trans. Am. Phil. Soc. n. s. vii. 312 (1841).—Calcareous gravels, meadows and ledges, Mingan Islands and Anticosti Island, Quebec; Yukon and Alaska to South Dakota, New Mexico and California; Asia.

2a. Var. LAURENTIANUS Victorin in Trans. Roy. Soc. Can. ser. 3, xx. (sect. v). 476 (1926).—Mingan Islands, Anticosti Island and adjacent mainland of Saguenay County, Quebec.

3. E. ELATUS Greene, Pittonia, iii. 164 (1897). *E. acris*, var. *oligocephalus* Fern. & Wieg. in RHODORA, xii. 226 (1910), excluding type. *E. acris*, var. *arcuans* Fern. in RHODORA, xxviii. 236 (1926).—Calcareous shores, gravels and turf, River Ste. Anne des Monts, Gaspé County, Quebec; northeastern Manitoba (Churchill) to Mackenzie, south in the Rocky Mountains of Alberta and British Columbia. An involucre, × 2, is shown in FIG. 3.

3a. Var. OLIGOCEPHALUS (Fern. & Wieg.) Fernald. *E. acris*, var. *oligocephalus* Fern. & Wieg. in RHODORA, xii. 226 (1910), as to type. *E. borealis* sensu Fernald in RHODORA, xxviii. 236 (1926), not (Vierh.) Simmons (1913).—Calcareous slopes, Labrador, easternmost Saguenay County, Quebec (Blanc Sablon, formerly included in Labrador) and northern Newfoundland. FIG. 1 shows one of the type-specimens, × 1; FIG. 2, an involucre, × 2.

As already pointed out, a specimen from somewhere in the Canadian Rocky Mountain region given to Gray by Hooker, as belonging to his inadequately published *Erigeron alpinus*, γ. *elatus*, is near if not quite *E. elatus*, var. *oligocephalus*. In 1926, accepting the identification by students of the Scandinavian and Greenland floras, I treated the plant of Labrador and Newfoundland as *E. borealis*. Abundant material of the latter plant of northern Europe and Greenland now shows it to be only slightly and perhaps not satisfactorily separable from the European *E. alpinus*. In its more ligneous rhizome, its firm and consistently small cauline leaves, its usually solitary erect head, its more villous involucre, its comparatively broad and conspicuous ligules and its double pappus *E. borealis* is quite distinct from *E. elatus* and its var. *oligocephalus*. A head of the Swedish *E. borealis* is shown, × 2, in FIG. 6.

ERIGERON RAMOSUS (Walt.) BSP., forma **discoideus** (Robbins), comb. nov. *E. strigosus* Muhl., var. *discoideus* Robbins ex Gray, Man. ed. 5: 237 (1867). *E. ramosus*, var. *discoideus* (Robbins) BSP. Prelim. Cat. N. Y. Pl. 27 (1888).

AMBROSIA TRIFIDA L., forma **integrifolia** (Muhl.) comb. nov.

A. integrifolia Muhl. in Willd. Sp. Pl. iv. 375 (1805). *A. trifida*, β. *integrifolia* (Muhl.) Torr. & Gray, Fl. No. Am. ii. 290 (1842).

THE VARIETIES OF BIDENS CORONATA (PLATE 506).—*Bidens coronata* (L.) Britton, the plant which long passed by the later name *B. trichosperma* (Michx.) Britton (not the strictly southern *B. mitis* (Michx.) Sherff, which long passed erroneously as *B. coronata*) has four well defined geographic varieties. As treated by Sherff in his *Genus Bidens*, pt. 1: 221 (1937) only two varieties are recognized:

> "Foliola plerumque lanceolato-linearia et inciso-dentata, achaeniis corpore 5–7 mm. longis.....*B. coronata* sensu stricto.
> Foliola (segmentave) angustissime linearia et saepe etiam integra, achaeniis minoribus.....Var. β. *tenuiloba.*"

According to Sherff's treatment var. *tenuiloba*, based by Gray on material from Indiana and Illinois, occurs "With the species proper and usually commoner."

When, however, we attempt to place specimens with lanceolate leaf-segments and achenes 9 mm. long, others with lanceolate segments and achenes 4.5 mm. long we become puzzled; when, furthermore, plants with linear segments only 1 mm. broad have achenes 7.5 mm. long, the inadequateness of present treatments of the species becomes more apparent. I am accordingly proposing the following treatment which recognizes four fairly defined geographic varieties.[1]

[1] The geographic segregates within the species and the geographic ranges in general would have been more evident if Sherff had followed the conventional geographic sequence in citation of specimens. To most users of a monograph the arrangement of cited specimens in a familiar geographic sequence is of far greater importance than the mere citation of specimens in alphabetical sequence of collector's names. The latter is a secondary item; the former records a fact usually of permanent significance. Without a logical geographic sequence in citation grave errors enter the generalizations. For instance, on his p. 315 Sherff gives the range within the United States of *Bidens laevis:* "From New Hampshire and Massachusetts southward along the coast to Florida and westward from Florida to California." From this generalization one would never guess that *B. laevis* grows in western New York and in West Virginia. Neither of these areas is "along the coast" nor "westward from Florida to California." Nevertheless, under the cited specimens one from Cayuga Marshes, New York comes between specimens recorded from Argentina and from Rhode Island, merely because the Argentina plant was distributed in the series, *Chloris Platensis Argentina*, the New York plant was collected by *Clinton* and the Rhode Island specimen seen was from *Congdon*. The West Virginia specimen cited is lost in five pages of geographically disorganized matter under the name *Guttenberg*.

Handel-Mazzetti has already protested this unscientific method of citing specimens (Oesterr. Bot. Zeitschr. lxxxvii.[2] 154) and he specially protests the incorrect entering under V of the Germanic prefix "von." He might have noted also that ubiquitous and unidentifiable collector "*anon.*" whose specimens are recorded in this sequence: Pennsylvania, Hawaii, and North Carolina. Every experienced taxonomist with whom I have conferred has urged the protesting of this novel method of citation.

a. Longest central achenes 6–9 mm. long.
Awns of central achenes 2.8–3.7 mm. long; larger outer achenes 5–6 mm. long, with awns mostly 2–2.6 mm. long; larger leaf-segments 4–20 mm. broad; outer involucre loosely ascending or spreading; plant of the interior
B. coronata, var. *typica*.
Awns of central achenes 0.6–1.8 mm. long; larger outer achenes 3.7–6 mm. long, with awns 0.6–1 mm. long; larger leaf-segments 1–12 mm. broad; outer involucre appressed-ascending.....Var. *brachyodonta*.
a. Longest central achenes 4.5–6 mm. long; larger leaf-segments 1–12 mm. broad.
Ligules 1.5–2.5 cm. long; awns of central achenes 1–2 mm. long; larger outer achenes 3–5.2 mm. long, with awns 0.4–1.6 mm. long; plants of the interior.....Var. *tenuiloba*.
Ligules 1.2–1.7 cm. long; awns of central achenes 1.8–3 mm. long; larger outer achenes 4.7–6 mm. long, with awns 1.5–1.8 mm. long; plant of Atlantic states.....Var. *trichosperma*.

B. CORONATA (L) Britton, var. **typica.** Figs. 4 and 5. *Coreopsis coronata* L. Sp. Pl. ed. 2, ii. 1281, as to descr. and specimen matching it in Herb. L. (1763). *Diodonta coronata* (L.) Nutt. in Trans. Amer. Phil. Soc. ser. 2, vii. 360 (1841). *B. coronata* (L.) Britton in Bull. Torr. Bot. Cl. xx. 281 (1893); Sherff in Bot. Gaz. lvi. 495 (1913) and Gen. Bidens, pt. 1: 221, in part, t. lix., figs. *m.* and *p–u* (1937).—Prairies, swales and rich bottoms, Connecticut Valley, Connecticut to southern Ontario and Nebraska, south to Delaware Valley, New Jersey, Pennsylvania, Ohio, Indiana and Illinois.

Var. **brachyodonta**, var. NOV. (TAB. 506, FIG. 1–3), foliorum segmentis linearibus vel anguste lanceolatis 1–12 mm. latis; involucris exterioribus 4.5–10 mm. longis, interioribus 5.5–7 mm. longis; ligulis 1.5–2.8 cm. longis; achaeniis exterioribus 3.7–6 mm. longis 1.9–2.4 mm. latis aristis 0.6–1 mm. longis; achaeniis centralibus longioribus 6–7.5 mm. longis 1.2–1.8 mm. latis aristis 0.6–1.8 mm. longis.—Bogs and peaty swamps, Essex County, Massachusetts to Delaware. The following, from a large series, are characteristic. MASSACHUSETTS: swale near Pilling Pond, Lynnfield, October 21, 1917, *Fernald;* wet sphagnous clearing near Chebacco Lake, Essex, September 11, 1913, *Fernald, Hunnewell & Long*, no. 10,690; black spruce bog, North Reading, August 31, 1932, *W. B. Drew;* Fresh Pond, Cambridge, September 3, 1853, *Wm. Boott;* wet meadows of Neponset River, Dedham, September 6, 1901, *Day & Fernald* in Pl. Exsicc. Gray. no. 48 (as *B. trichosperma*); Broad Meadows, Needham, September 13, 1891, *T. O. Fuller;* Lakeville, September 25, 1903, *E. W. Hervey;* open swamps, Easton, October 18, 1919, *C. F. Batchelder;* swamp, Raynham, September 15, 1923, *Cheever & Knowlton;* boggy meadows near Fresh Pond, Dennis, September 2, 1918, *Fernald*, no. 17,612; cranberry bogs, Harwich, October 13, 1918, *Fernald*, no. 17,613 (TYPE in Gray Herb.). RHODE ISLAND: South Kingston, 1850, *S. T. Olney.* NEW YORK: Merricks, Long Island, September 8, 1916, *House.* DELAWARE: high

ground near Newport, New Castle County, September 9, 1899, *Canby*.

With the exception of var. *typica* in the Connecticut Valley, var. *brachyodonta* is the one variation of *Bidens coronata* in New England and apparently the only one on Long Island. It is presumably in New Jersey, since Canby collected it in Delaware. Its leaf-segments vary rather indiscriminately, even in the same colonies, from narrowest linear to lanceolate. Its achenes are nearly as large as in var. *typica* but the awns are strikingly shorter.

Var. TENUILOBA (Gray) Sherff in Bot. Gaz. lxxxvi. 446 (1928). FIGS. 6 and 7. *Coreopsis trichosperma* Michx., var. *tenuiloba* Gray, Syn. Fl. N. Am. i^2. 295 (1884). *B. trichosperma*, var. *tenuiloba* (Gray) Britton in Bull. Torr. Bot. Cl. xx. 281 (1893).—Bogs and swales, southern Ontario to Minnesota, south to Ohio, Indiana, Illinois, Iowa and Nebraska.

Although var. *tenuiloba* has been treated as merely a narrow-lobed and small-fruited phase of *Bidens coronata*, it should be noted that its leaf-segments are highly variable and may be quite like those of var. *typica*. The original material which Gray had before him showed such range of variation in the foliage; but its achenes are shorter than in var. *typica* and their awns are very much shorter. The series seems to be a reasonably defined variety and, singularly enough, its counterpart is on the coastal plain from New Jersey to Florida, which shows in length of awns a closer approach to var. *typica* of the interior. The latter plant is

Var. **trichosperma** (Michx.) comb. nov. FIGS. 8 and 9. *Coreopsis trichosperma* Michx. Fl. Bor.-Am. ii. 139 (1803). *B. trichosperma* (Michx.) Britton in Bull. Torr. Bot. Cl. xx. 281 (1893).—Bogs and swamps, New Jersey and eastern Pennsylvania to Florida. The following, from among many sheets, are typical. NEW JERSEY: Moonachie, September 21, 1901, *E. E. Magee;* Woodbridge, September 21, 1889, *J. R. Churchill.* PENNSYLVANIA: wet soil, Tullytown, September 20, 1930, *W. M. Benner.* VIRGINIA: tidal marsh, Capitol Landing, Queen's Creek, Charles City County, *Grimes*, no. 4291; border of tidal marsh along Gray's Creek, near Cross Creek Landing, south of Swann Point, *Fernald & Long*, no. 6909 (see FIG. 8); Northwest, Norfolk County, *Heller*, no. 1247. GEORGIA: swamp of Satilla River, near Woodbine, Camden Co., *Harper*, no. 1562 (see FIG. 9).

Var. *trichosperma* is, if the slight representation in the Gray Herbarium from Virginia southward can be taken as indicative, the only variation of *Bidens coronata* in the Southeast. In its very short

achenes it approaches, as has repeatedly been noted, the southern *B. mitis* (Michx.) Sherff, but the achenes are minutely strigose-ciliolate, with awns 1.5–3 mm. long, whereas all good achenes of *B. mitis* (FIG. 10), which I have examined, run smaller (2–5 mm. long), have glabrous margins and have shorter awns (at most up to 1 mm. long on the central achenes, almost obsolete and blunt on the marginal achenes). Although Sherff (Genus Bidens, pt. 1: 231, in footnote) specially selects Harper's no. 1562 (FIG. 9) as typical of *B. mitis*, the sheet thus marked by him in the Gray Herbarium has, it seems to me, the characteristic achenes of *B. coronata*, var. *trichosperma*. As to the identity of *Coreopsis trichosperma*, Michaux described it from "humidis Carolinae superioris" immediately before his *C. mitis*. Mr. J. Francis Macbride, now in Paris, has most kindly made comparison of achenes with those of Michaux's two types involved and reports that the type of *Coreopsis trichosperma* is too young for proper comparison but that the plant looks like the coastwise series with narrow leaf-segments. The type of *C. mitis* has 2 central achenes left. One of these has been sent me, through Mr. Macbride, by Professor Pellegrin for examination and return to the Michaux herbarium. It is quite smooth on the margins, 5 mm. long and with no true awns, merely broadly deltoid low teeth. This achene has been photographed, much enlarged and prints from the negative can be supplied by the Gray Herbarium. It is much larger than those shown in FIG. 10. It is closely matched by achenes of *Grimes*, no. 4546, from grassy bank by Dismal Swamp Canal, Wallacetown, Virginia. The latter plant is almost exactly duplicated by *Fernald, Long & Fogg*, no. 5136, from fresh to brackish swales of North Landing River, near Creed's, Virginia. Grimes's material, in fruit, was collected in October; the flowering material from North Landing River (distributed as *B. coronata*, var. *tenuiloba*) on September 9th. It is desirable to secure material of it in October. I wish here to express to Professor Pellegrin and Mr. Macbride my great appreciation of their help.

BIDENS **infirma**, sp. nov. (TAB. 507, FIG. 1–3), herba annua diffuse ramosa 1–2.5 dm. alta; foliis membranaceis anguste petiolatis, laminis anguste lanceolatis apice basique attenuatis, margine argute grosseque serrato-dentatis; capitulis discoideis campanulatis 7–13-floris 4–8 mm. diametro pedunculatis, pedunculis tenuibus 1–3 cm. longis; involucris glabris; bracteis exterioribus 2–4 linearibus vel lanceolatis, interioribus oblongis subacutis 5–8 mm. longis; achaeniis planis oblanceolatis apice valde rotundatis vel convexis strigosis utrinque

unicostatis, margine sparse antrorso-ciliatis, exterioribus 4–6.3 mm. longis 1–1.5 mm. latis inermibus, centralis 5.5–8 mm. longis 1–1.4 mm. latis plerumque breviter aristatis, aristis divergentibus 0.2–0.8 mm. longis antrorse setulosis. *B. heterodoxa*, var. *atheistica* Fernald in RHODORA, xxxiv. 116 (1934).—Tidal mud and slaty intertidal gravels of the St. Lawrence, Bellechasse County, Quebec: Anse St. Vallier, September 15, 1931, *Fernald*, nos. 2952, 2955 (TYPE in Gray Herb.), 2960; St. Vallier, 26 Août 1931, *Victorin, Rolland & Jacques*, no. 44,152 (as *B. Eatoni*), 1 Octobre 1932, *Victorin, Rolland & Jacques*, no. 44,116 (as *B. Eatoni*).

Bidens infirma is the little plant of the tidal flats of Bellechasse County which I described as *B. heterodoxa*, var. *atheistica*. So long as it was considered a variety of *B. heterodoxa*, with parallel varieties *orthodoxa* and *agnostica*, its varietal name had some appropriateness. For a species apart from them its original name would be quite meaningless. I have, therefore, exercised the right, treating it as a species, of giving a new name.

Bidens infirma is at once distinguished by the remarkable achenes (FIG. 3) with rounded or dome-like summits, the outer ones unarmed, the intermediate and central ones either awnless or with very short and strongly divergent upwardly barbellate awns. *B. heterodoxa* (FIGS. 4–6) has the achenes truncate at summit, as in most of our species, typical *B. heterodoxa* (FIG. 4) of Prince Edward Island and the Magdalen Islands with long ascending upwardly barbellate awns, var. *orthodoxa* (FIG. 5) of the Magdalen Islands with them retrorsely barbed. Var. *agnostica* (FIG. 6) differs from them in having the awns wholly or nearly barbless and slightly longer.

The photographs sufficiently indicate the strong specific claims of *Bidens infirma*. It is still another of the remarkable endemics of the intertidal flats of the St. Lawrence estuary.

BIDENS FRONDOSA L., forma **anomala** (Porter), comb. nov. *B. frondosa*, var. *anomala* Porter ex Fernald in RHODORA, v. 91 (1903).

For two to three decades it was thought that the plant with antrorsely barbellulate awns was essentially maritime. We now knew it to grow inland through much of the range of typical *Bidens frondosa*.

BIDENS VULGATA Greene, forma **puberula** (Wieg.) comb. nov. *B. frondosa* L., var. *puberula* Wiegand in Bull. Torr. Bot. Cl. xxvi. 408 (1899). *B. vulgata*, var. *puberula* (Wieg.) Greene, Pittonia, iv. 250 (1901). *B. puberula* (Wieg.) Rydb. Fl. Pr. Plains, 849 (1932).

Scattered through the range of typical glabrate *Bidens vulgata*, seemingly only a more pubescent form.

Ratibida columnifera (Nutt.) Woot. & Standl., forma **pulcherrima** (DC.) comb. nov. *Obeliscaria pulcherrima* DC. Prodr. v. 559 (1836). *R. columnaris*, var. *pulcherrima* (DC.) D. Don in Sweet's Brit. Fl. Gard. ser. 2, iv. 361, pl. 361 (1838). *Lepachys columnaris*, var. *pulcherrima* (DC.) Torr. & Gray, Fl. N. Am. ii. 315 (1842). *R. columnifera*, var. *pulcherrima* (DC.) Woot. & Standl. in Contrib. U. S. Nat. Herb. (Fl. N. Mex.) xix. 706 (1915). *L. columnifera*, var. *pulcherrima* (DC.) Rydb., Fl. Prair. Pl. 838 (1932). *R. columnaris*, forma *pulcherrima* (DC.) W. M. Sharp in Ann. Mo. Bot. Gard. xxii. 70 (1935).

The necessity to make a new combination for the color-form of *Ratibida columnifera* with purple or purple-marked ligules arises through the failure of some authors to trail names to their ultimate sources. Both the generic and the specific names here involved need elucidation.

Rafinesque, with customary flexibility, had three generic names for the small American genus which, before him, had been included under *Rudbeckia*. In 1817 he published two of them, with very brief but technically sufficient and significant diagnoses and each with a previously published species of *Rudbeckia* cited as typical. In discussing segregates of *Rudbeckia* he said

"All the species with naked seeds as *R. pinnata &c.* must form my genus *Obelisteca*, and those with a simple perianthe, such as *R. columnaris* Pursh, my genus *Ratibida*. Raf."[1]

In later works Rafinesque maintained *Ratibida* and, unfortunately, many authors have dated the publication of this genus from one of the later treatments, not from the earliest publication. Thus Macbride, returning from *Ratibida* to the longer-used but really later *Lepachys*, said

"In accordance with Art. 38 of the International Rules of Botanical Nomenclature, *Lepachys* Raf. Journ. Phys. lxxxix. 100 (1819), although a later name than *Ratibida* Raf. Am. Monthly Mag. ii. 268 (1818), is retained since the latter was published "without diagnosis or reference to a former description under another name" and therefore "is not valid."[2]

And Rydberg, after using *Ratibida* for many years, dated from the American Monthly Magazine (Feb., 1818), instead of from Flora Ludoviciana (1817), swung, in his late period of conservatism, to *Lepachys* Raf. (1819), in synonymy referring to "*Ratibida* Raf., hyponym." Now, by the example of a hyponym given in the Century

[1] Raf. Fl. Ludov. 73 (1817).
[2] J. F. Macbride in Contrib. Gray Herb. n. s. no. lxv. 45 (1922).

Dictionary, taken from F. S. Earle, Science, n. s. xix. 509 (March 25, 1904), "Some are *hyponyms*, never having been associated with a recognizable binomial species", it becomes clear that *Ratibida* as used by Rafinesque in 1818 was *not* a hyponym. Incidentally it should be noted that Macbride erred in stating that Rafinesque in 1818 gave no reference to a former description. Rafinesque was reviewing Pursh's Flora (1814) and in so doing took the opportunity to rename many of the species and genera. Of Pursh's *Rudbeckia columnaris* he said "125. *Rudbeckia columnaris* must form the genus *Ratibida* of Raf. fl. Miss."[1] *Ratibida* at this point had no diagnosis but it certainly was "associated with a recognizable binomial." Incidentally, Rafinesque referred back to an earlier publication. To be sure he called it "fl. Miss.", instead of Flora Ludoviciana, but that was a mild error for him! As already noted, in the latter work (1817) the genus was passably set forth and the objections to it arising from starting with 1818 disappear. Dr. W. M. Sharp has properly reinstated *Ratibida* in his study of the genus.[2]

In the same paper Sharp, however, rejects the first published specific name *Rudbeckia columnifera* Nuttall in Frasers' Cat. no. 75 (1813), and retains the long-used but later *R. columnaris* Sims in Curt. Bot. Mag. xxxix. plate 1601 (1814), Sharp giving the date of the latter as "1813." In regard to the date he does not state why he credits *R. columnaris* to 1813. The title-page distinctly says 1814. Presumably the new interpretation of date arose through the fact that plate 1601, like plates 1600 and 1602–1605, has the engraver's date "Dec. 1, 1813," while plates 1592–1599 are dated by the engraver "Nov. 1, 1813." The dates of the engravings, I take it, do not mean that these plates with their accompanying text were issued to the public on November 1 and December 1 respectively. The text with them indicates that they were issued considerably later.

Pursh's Flora Americae Septentrionalis, with the Preface dated "*December* 1813," was published in 1814, and in it he repeatedly cited plates in the Botanical Magazine prior to vol. xxxix. In the latter volume 4 North American species were originally described and also illustrated with the engraver's date "Nov. 1, 1813." These were *Oenothera missouriensis* (pl. 1592), *O. caespitosa* (pl. 1593), *Tradescantia subaspera* (pl. 1597) and *Helonias graminea* (pl. 1599); yet not

[1] Raf. in Am. Month. Mag. ii. 268 (Feb., 1818).
[2] W. M. Sharp in Ann. Mo. Bot. Gard. xxii. 62 (1935).

one of them was mentioned by Pursh in 1814. *Rudbeckia columnaris* (pl. 1601) was independently described by Pursh under that name, but with no reference to the account by Sims and the plate, Pursh renaming the earlier *R. columnifera* Nuttall in Frasers' Catalogue, which he cited. Added to the fact that Pursh nowhere cited any of the descriptions and plates in Bot. Mag. xxxix. we have the striking circumstance that, in the text accompanying the plates of other but previously published North American species, dated by the engraver "Nov. 1, 1813" or "Dec. 1, 1813," Pursh's Flora, even to exact page and plate, was regularly cited (see *Lophiola aurea*, pl. 1596; *Sabbatia calycosa*, pl. 1600; *Galardia bicolor*, pl. 1602). It should be clear, then, that *Rudbeckia columnaris* Sims did not antedate *R. columnaris* Pursh.

With the date of publication of *Rudbeckia columnaris* as well settled as is possible without full knowledge of the exact month and day of issue, the proper name for the species must be considered. Sharp, in the paper mentioned, sees no difficulty about taking up the generic name as sufficiently defined by Rafinesque's brief phrase of 1817; but he balks at using the first specific epithet for the species in hand, saying (l. c. 62, 63):

"The name *Rudbeckia columnifera* Nutt. was first published in "Fraser's Catalogue" in 1813. The description accompanying it is so indefinite that the name *R. columnifera* may be regarded as a *nomen subnudum*. Nuttall himself in the "Genera of North American Plants" in 1818 abandoned his name *R. columnifera* and recognized *Rudbeckia columnaris* Pursh."

The fact that Nuttall abandoned the name in 1818 is not significant, nor is it universally felt that Nuttall's original diagnosis of 1813 is not intelligible. Here it is:

"75 *Rudbeckia columnifera. ‡ Spontaneous varieties of this plant sometimes occur with bright fulvous flowers, colored like *Tagetes patula;* the stem is simple, seldom producing more than three flowers, which are of an uncommon length, appearing like a column of flosculi, subtended by 5–8 neutral florets, and a simple calyx."[1]

Certainly this is a far more intelligible diagnosis of a species than was the original characterization of *Ratibida* for a genus! Wooton & Standley, Macbride and Rydberg have all found it distinctive and, even if it seem to some only a "*nomen subnudum*" in spite of the three distinctive characters given, it should be noted that the name

[1] Nuttall in Frasers' Cat. no. 75 (1813).

Rudbeckia columnifera was understood by Pursh when, in 1814, he cited it without qualification as an exact synonym of his newly proposed *R. columnaris*. The name *R. columnaris* Pursh, Fl. Am. Sept. 575 (1814), with "R. columnifera, *Fraser catal.* 1813" definitely cited as the same, was, consequently, in part an illegitimate (or substitute) name for *R. columnifera* and to that extent it cannot be maintained!

There is no question about the plant which Nuttall described in Frasers' Catalogue. It was grown in the Frasers' garden from seed supplied by Nuttall; and in the year following Frasers' Catalogue it was published as *Rudbeckia columnaris* Sims in the Botanical Magazine, with a beautiful plate of the common yellow-rayed plant. The Sims plant "was introduced, we believe, by Mr. NUTTALL, from the country of the Missouri; our drawing was taken at the Nursery of Messrs. J. and J. T. FRASER." *Rubdeckia columnifera* Nuttall (1813) and *R. columnaris* Sims (1814) were, then, based on the same material; the name *R. columnaris* Pursh (1814) was, in part at least, an illegitimate substitute for *R. columnifera*.

Only one other name is available for the yellow-rayed plant. This is *Ratibida sulcata* Raf. Journ. de Phys. lxxxix. 100 (1819); but that, too, was a substitute-name: "Son type est la *Rudbeckia columnari*[*s*] de Pursh, qui devra s'appeller *Ratibida sulcata*."

CACALIA **Muhlenbergii** (Sch. Bip.), comb. nov. *C. reniformis* Muhl. in Willd. Sp. Pl. iii³. 1735 (1804), not Lam. Fl. Fr. ii. 75 (1778). *Senecio Muhlenbergii* Schultz Bip. in Flora, xxviii. 499 (1845). *Mesadenia Muhlenbergii* (Sch. Bip.) Rydberg, Fl. Pr. Pl. 873 (1932).

In 1921 House, citing *Cacalia reniformis* as published in Willdenow's Species, vol. "73: 1753" (instead of vol. 3, pt. 3, p. 1735), pointed out that the name is invalidated by *C. reniformis* Lam. (1778). He, therefore, made for it the new combination *C. rotundifolia* (Raf.) House, N. Y. State Mus. Bull. nos. 233–234: 67 (1921), based upon *Mesadenia rotundifolia* Raf. New Fl. iv. 79 (1838), without discussion of what Rafinesque may have had.[1] As to the latter question, it is significant that *C. reniformis* Muhl. is a tall plant (4–9 ft.—*Gray*, Syn. Fl.; 0.9–3 m.—*Small;* 1–3 m.—*Rydberg*); that it has the leaves green on both sides (though paler beneath) as contrasted with the glaucous

[1] Incidentally, those who, like Small and Rydberg, have taken up for one section of *Cacalia* L. the name *Mesadenia* Raf. (1832 and 1838) pass over the fact that in 1828 Rafinesque had attempted to substitute an earlier *Mesadenia* Raf. Med. Fl. i. 198 (1828) for *Frasera* Walt. of the *Gentianaceae*. For *Mesadenia* Raf. (*Compositae*) the proper generic name, for those who consider it a genus, seems to be *Conophora* (DC.) Nwd. in Am. Midl. Nat. iii. 193 (1914).

foliage of *C. atriplicifolia* L., the lower ones very large ("often 2 feet wide"—*Gray*, Syn. Fl.; "10–60 cm. wide"—*Small;* "1–2.5 dm. wide" —*Rydberg*) and abundantly dentate, the cauline distinctly petioled. Rafinesque's *Mesadenia rotundifolia* was "2 or 3 feet high," with leaves "entire or repand glaucous beneath . . . lower . . . 3 or 4 inches long and broad . . . upper sessile." It is most probable that *Mesadenia rotundifolia* Raf. had nothing to do with *Cacalia reniformis* Muhl.; *Index Kewensis* even refers it to *Vernonia!* Had Dr. House, before publishing the combination *C. rotundifolia* (Raf.) House (1921), consulted the latter indispensible work he would have found that an Indian species was published as *C. rotundifolia* Willd. Sp. Pl. iii³. 1732 (1804), in the same treatment in which *C. reniformis* Muhl. was first described. Even if it is possible to guess what Rafinesque may have had, the name *C. rotundifolia* (Raf.) House (1921) is clearly antedated by *C. rotundifolia* Willd. (1804).

Explanation of Plates 497–507

Plate 497. Panicum recognitum, sp. nov.: fig. 1, type, × ½, from Albion, New Jersey, *Long*, no. 7671; fig. 2, base of cauline leaf, × 1, from the type; fig. 3, pubescence of sheath, × 10, from type; fig. 4, node, × 10, from type; fig. 5, pulvinus and base of panicle-branch, × 10, from type; fig. 6, spikelets, × 10, from type.

Plate 498. Panicum recognitum, sp. nov.: plant, × ½, showing autumnal branching, from type-station, *Long*, no. 4944.

Plate 499. Asarum canadense, forma Phelpsiae, f. nov.: type, × 1, from Gouverneur, New York, *Orra Parker Phelps*, no. 1143.

Plate 500. Agrimonia striata Michx.: fig. 3, fruit, × 8, from Franklin, Connecticut, October 2, 1906, *R. W. Woodward.*

A. striata, var. campanulata, var. nov.: fig. 1, plant, × 3/8, from Rincon Mountains, Arizona, *Blumer*, no. 3384; fig. 2, fruit, × 8, from Ramsey Cañon, Huachuca Mountains, Arizona, *Marcus E. Jones*, no. 24,920 (type).

Plate 501. Polygala verticillata L.: fig. 1, one of the two plants in the Linnean Herbarium, type of the species, × 1, courtesy of *Mr. Spencer Savage.*

Var. isocycla, var. nov.: fig. 2, one of several plants, × 1, from Frazer, Pennsylvania, *E. B. Bartram*, no. 1124 (type); fig. 3, raceme, × 4, of the type, to show fruit.

Var. sphenostachya Pennell: fig. 4, raceme, × 4, from Swope Park, Missouri, *Bush*, no. 7692 (isotype), to show fruit.

Plate 502. Sufficiently explained on p. 341.

Plate 503. Hackelia americana (Gray) Fernald: fig. 1, portions of a plant, × 1, from Burnt Bluff, Delta County, Michigan, *Fernald & Pease*, no. 3492; fig. 2, expanded flower, × 4, from no. 3492; fig. 3, fruiting branch, × 1, from Percé, Quebec, *Collins, Fernald & Pease* (*Pease*, no. 5482); fig. 4, fruiting branch, × 1, also from Percé; fig. 5, fruit, × 8, from same plant as fig. 3; fig. 6, separated nutlet, × 8, showing prickles on back, from Mackinac Island, Michigan, August 4, 1910, *J. R. Churchill.*

Plate 504. Hackelia deflexa (Wahlenb.) Opiz: fig. 1, portions of plants, × 1, from Torne Lappmark, *Alm* (Intern. Phytogeogr. Exc., 1925, no. 6285); fig. 2, fruiting branch, × 1, from the Altai, *B. K. Schishkin;* fig. 3, portions of racemes, × 1, from Bohemia, *Petrak*, Fl. Bohem. Morav. Exsicc., Lfg. V. no.

484; FIG. 4, flower, × 4, from same collection as FIG. 1; FIG. 5, fruit, × 8, from Songaria, *Schrenk;* FIG. 6, fruit, × 8, from above Zermatt, Switzerland, *Wilczek;* FIG. 7, separated nutlet, × 8, from Norland, Norway, *Ove Dahl.*

H. VIRGINIANA (L.) I. M. Johnston: FIG. 8, fruit, × 8, from Newton, Massachusetts, September 5, 1897, *E. F. Williams.*

PLATE 505. ERIGERON ELATUS Greene: FIG. 3, head × 2, from Carbon River, British Columbia, *Raup & Abbe*, no. 4270a.

E. ELATUS, var. OLIGOCEPHALUS (Fernald & Wiegand) Fernald: FIG. 1, one of the TYPE-SPECIMENS, Blanc Sablon, Labrador, *Fernald & Wiegand*, no. 4138; FIG. 2, head, × 2, from TYPE.

E. ELONGATUS Ledebour: FIG. 4, head, × 2, from Tracadigash Point, Carleton, Quebec, *Fernald & Weatherby*, no. 2472.

E. ACRIS L.: FIG. 5, head, × 2, from Mähr-Weisskirchen, Bohemia, *Petrak,* Fl. Bohem. Morav. Exsicc. Lfg. I, no. 92.

E. BOREALIS (Vierh.) Simmons: FIG. 6, head, × 2, from Jämtland, Sweden, July 15, 1934, *Nannfeldt.*

PLATE 506. BIDENS CORONATA (L.) Britton, var. BRACHYODONTA, var. nov.: FIG. 1, plant, × 2/5, from Chebacco Lake, Essex, Massachusetts, *Fernald, Hunnewell & Long*, no. 10,690; FIG. 2, outer (broad) and central (narrow) achenes, × 4, from the TYPE, Harwich, Massachusetts, *Fernald*, no. 17,613; FIG. 3, achenes, × 4, from Pilling Pond, Lynnfield, Massachusetts, October 21, 1917, *Fernald.*

Var. TYPICA: FIG. 4, outer (broad) and central (narrow) achenes, × 4, from Delaware River, "New Jersey, near Philada.," *A. Gray;* FIG. 5, achenes, × 4, from Peoria, Illinois, 1869, *Stewart.*

Var. TENUILOBA (Gray) Sherff: FIG. 6, outer (broader) and central achenes, × 4, from one of the original sheets, Peoria. Illinois, 1869, *Stewart;* FIG. 7, achenes, × 4, from Buffalo Lake, Montello, Wisconsin, *Fassett*, no. 8964.

Var. TRICHOSPERMA (Michx.) Fernald: FIG. 8, outer (broad) and central (narrow) achenes, × 4, from south of Swann Point, Virginia, *Fernald & Long* no. 6909; FIG. 9, achenes, × 4, from Satilla River near Woodbine, Georgia, *Harper*, no. 1562.

B. MITIS (Michx.) Sherff: FIG. 10, outer (broader) and central achenes, × 4, from Leavy County, Florida, November, 1877, *Garber.*

PLATE 507. BIDENS INFIRMA, sp. nov.: FIG. 1, portion of TYPE, × 1, from Anse St. Vallier, Quebec, *Fernald*, no. 2955; FIG. 2, head, × 2; FIG. 3, achenes (shortest marginal, longest central), × 4.

B. HETERODOXA (Fern.) Fern. & St. John: FIG. 4, achenes, × 4, from Southport, Prince Edward Island, *Fernald, Long & St. John*, no. 8205.

B. HETERODOXA, var. ORTHODOXA Fernald & St. John: FIG. 5, achene, × 4, from Alright Island, Magdalen Islands, *Fernald, Long & St. John*, no. 8204.

B. HETERODOXA, var. AGNOSTICA Fernald: FIG. 6, achene, × 4, from Pocotapaug Lake, Chatham, Connecticut, *Fassett*, no. 2369.

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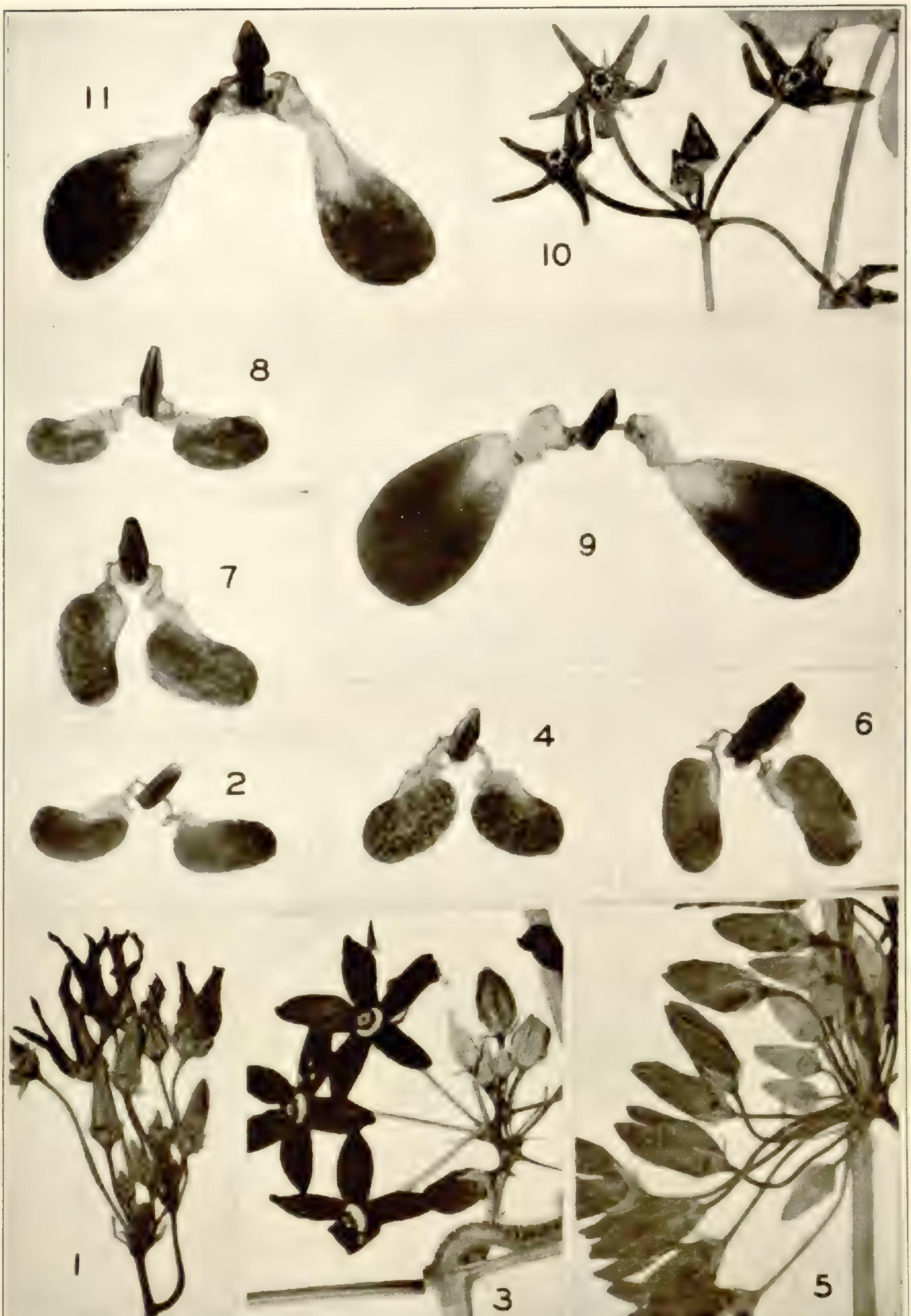
Thalictrum ametrum, 319, 320; Fendleri, 318, 319, var. ? polycarpum, 318, 319; multiflorum, 319; polycarpum, 318, 319, S. Wats., a Disputed Name, 317
Tordylium, 291; Anthriscus, 291
Torilis, 291; Anthriscus, 291; japonicus, 291
Tradescantia subaspera, 354
Trichostema foliis setaceis, 292; lineare, 292; setaceum, 292

Umbelliferae, 291

Varieties of Bidens coronata, The, 348, pl. 506.
Vernonia, 357
Villarsia, 340; aquatica, 339, 340; cordata, 338, 340; lacunosa, 338–340; trachysperma, 340
Vincetoxicum, 281–283; acanthocarpos, 282, 285; Baldwinianum, 286; carolinense, 285, 286; gonocarpos, 282–284; obliquum, 287; Shortii, 287; suberosum, 284

PLATES



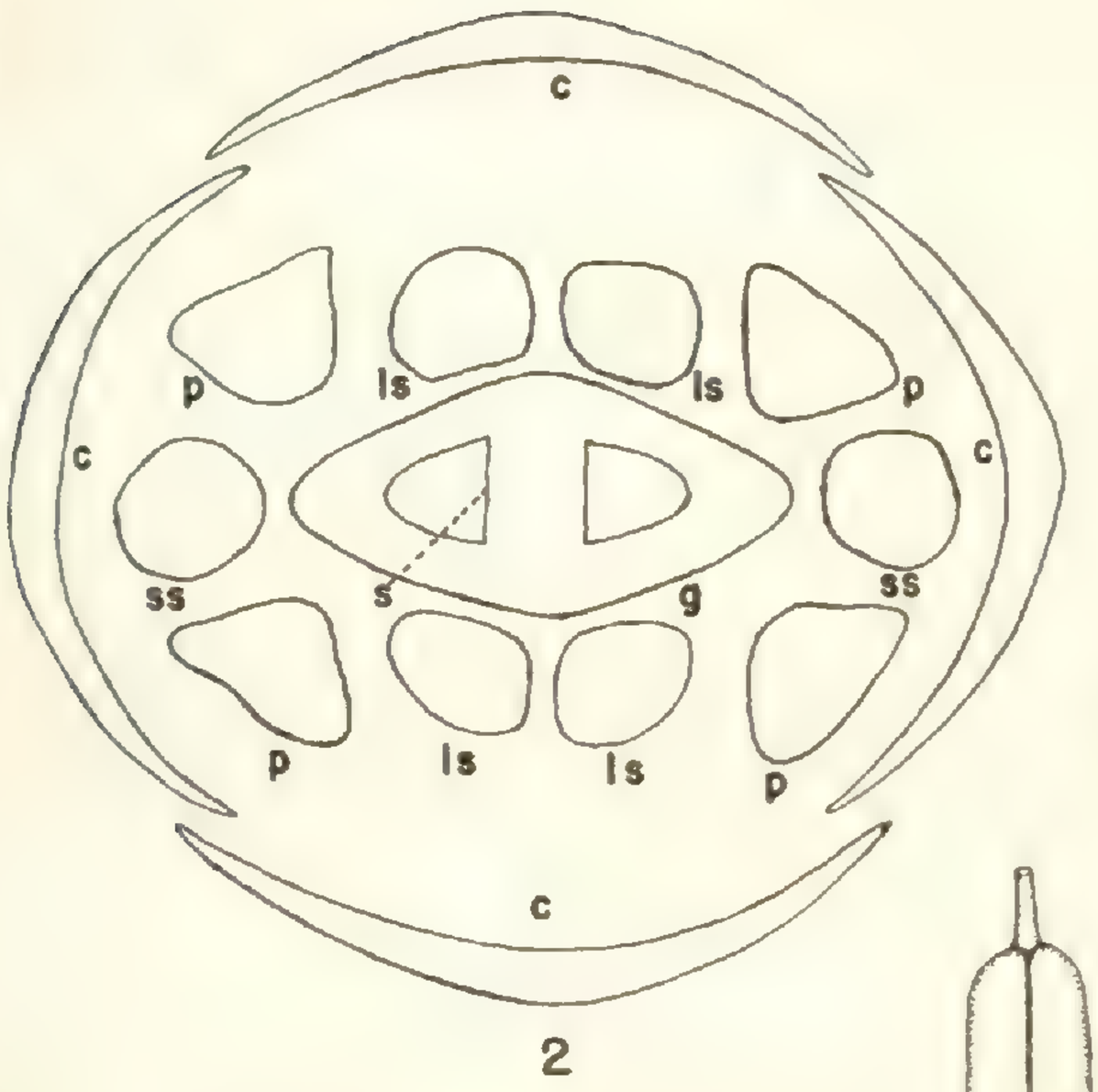
GONOLOBUS: parts of inflorescences, × 1; pollinia, × 40.
G. OBLIQUUS, FIGS. 1 and 2. G. CAROLINENSIS, FIGS. 3 and 4. G. DECIPIENS, FIGS. 5 and 6. G. SHORTII, FIG. 7. G. BALDWYNIANUS, FIG. 8. G. GONOCARPUS, FIGS. 9 and 10. G. SUBEROSUS, FIG. 11.

TAB. X

PEDICULARIS LABRADORICA Wirsing.

Reproduction of plate 10, Wirsing's "Eclogicae botanicae" (1778). This figure was also reproduced by Panzer, Pflanzensyst. viii. *t. 57C* (1782).

A



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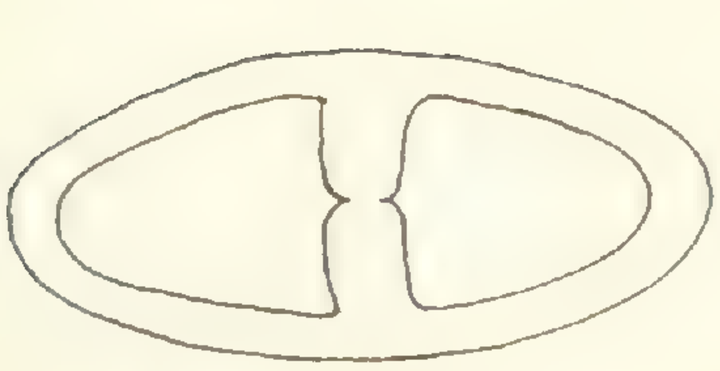

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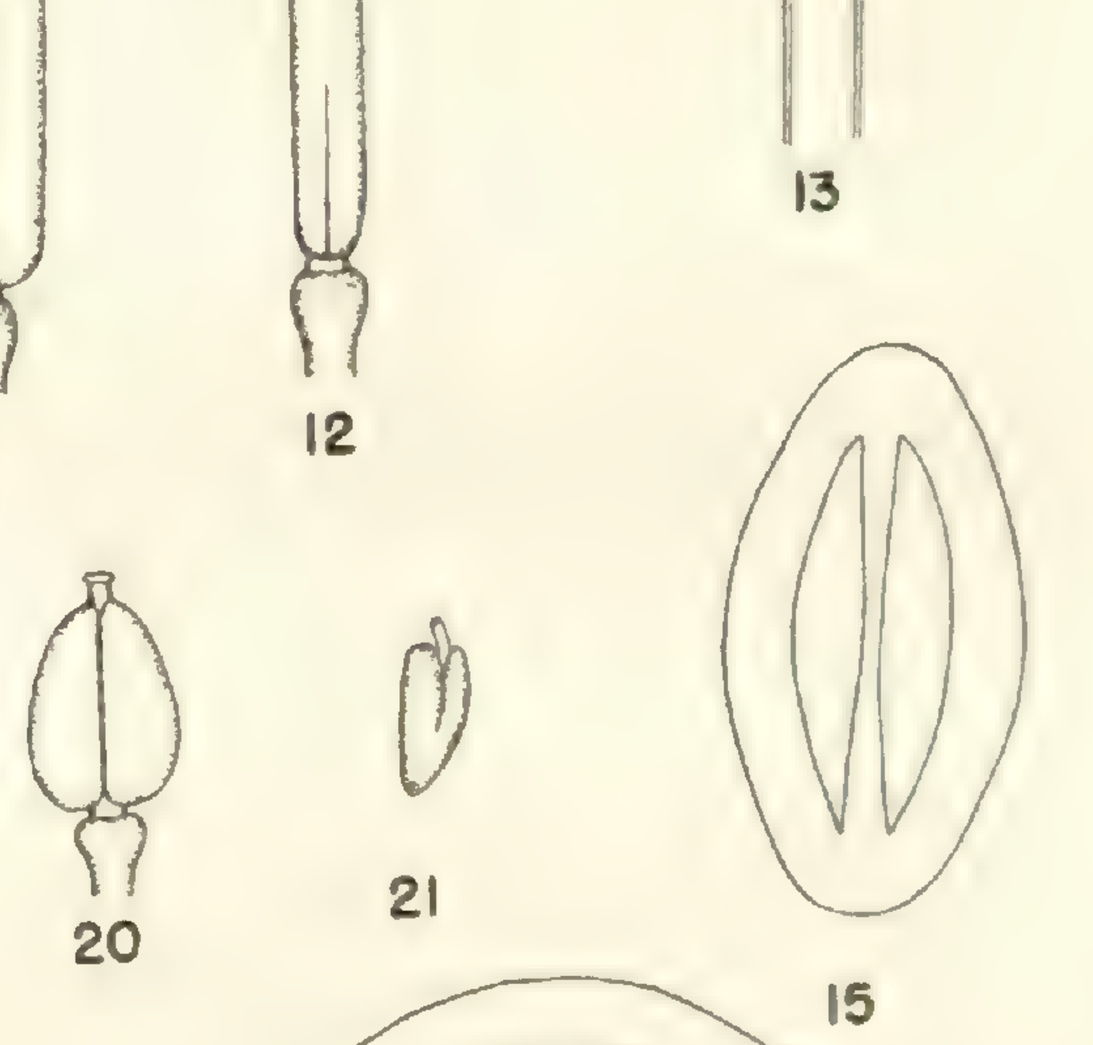

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Floral and Fruiting Characters of (A) Polyctenium and of (B) Smelowskia.

Photo. H. G. Fernald.

PANICUM RECOGNITUM: FIG. 1, TYPE, × ½; FIG. 2, base of cauline leaf, × 1; FIG. 3, pubescence of sheath, × 10; FIG. 4, node, × 10; FIG. 5, pulvinus and base of panicle-branch, × 10; FIG. 6, spikelets, × 10.

Photo. H. G. Fernald.

PANICUM RECOGNITUM: plant showing autumnal branching, × ½.

Photo. H. G. Fernald.

ASARUM CANADENSE, forma PHELPSIAE: TYPE, × 1.

Photo. H. G. Fernald.

AGRIMONIA STRIATA: FIG. 3, fruit, × 8.

A. STRIATA, var. CAMPANULATA: FIG. 1, plant, × ⅜, from Arizona; FIG. 2, fruit, × 8, from TYPE.

Photo. E. C. Ogden.

POLYGALA VERTICILLATA: FIG. 1, one of the 2 plants in Linnean Herbarium (TYPE), × 1, *courtesy of* Mr. Spencer Savage.

Var. ISOCYCLA: FIG. 2, TYPE, × 1; FIG. 3, raceme, × 4, from TYPE.

Var. SPHENOSTACHYA: FIG. 4, raceme, × 4, from ISOTYPE.

Photo. H. G. Fernald.

HYDROPHYLLUM VIRGINIANUM, forma SIMPLICIFOLIUM: TYPE, × 2/5.

Photo. H. G. Fernald.

HACKELIA AMERICANA: FIG. 1, portions of plant, × 1, from Michigan; FIG. 2, expanded flower, × 4, from Michigan; FIGS. 3 and 4, fruiting branches, × 1, from Quebec; FIG. 5, fruit, × 8, from Quebec; FIG. 6, nutlet, × 8, from Michigan.

Photo. H. G. Fernald.

HACKELIA DEFLEXA: FIG. 1, portions of plants, × 1, from Torne Lappmark; FIG. 2, fruiting branch, × 1, from the Altai; FIG. 3, branches, × 1, from Bohemia; FIG. 4, flower, × 4, from Torne Lappmark; FIG. 5, fruit, × 8, from Songaria; FIG. 6, fruit, × 8, from Switzerland; FIG. 7, nutlet, × 8, from Norway.

H. VIRGINIANA: FIG. 8, fruit, × 8, from Massachusetts.

Photo. H. G. Fernald.

ERIGERON ELATUS: FIG. 3, head, × 2.

E. ELATUS, var. OLIGOCEPHALUS: FIG. 1, one of TYPE-SPECIMENS, × 1; FIG. 2, head, × 2.

E. ELONGATUS: FIG. 4, head, × 2.

E. ACRIS: FIG. 5, head, × 2.

E. BOREALIS: FIG. 6, head, × 2.

Photo. E. C. Ogden.

BIDENS CORONATA, VAR. BRACHYODONTA: FIG. 1, plant, × 3/5; FIG. 2, outer (broad) and central (narrow) achenes, × 4, from TYPE, Harwich, Massachussetts; FIG. 3, achenes, × 4, from Lynnfield, Massachusetts.

Var. TYPICA: FIG. 4, achenes (outer broad, central narrow), × 4, from Delaware River; FIG. 5, achenes, × 4, from Illinois.

Var. TENUILOBA: FIG. 6, achenes (outer shorter), × 4, from TYPE, Illinois; FIG. 7, achenes, × 4, from Wisconsin.

Var. TRICHOSPERMA: FIG. 8, achenes (outer broader), × 4, from Virginia; FIG. 9, achenes, × 4, from Georgia.

B. MITIS: FIG. 10, achenes, × 4, from Florida.

Photo. E. C. Ogden.

Bidens infirma: fig. 1, portion of type, × 1; fig. 2, head, × 2; fig. 3, achenes (shorter marginal, longest central), × 4.

B. heterodoxa: fig. 4, achenes, × 4, from Prince Edward Island.

B. heterodoxa, var. orthodoxa: fig. 5, achene, × 4, from Magdalen Islands.

B. heterodoxa, var. agnostica: fig. 6, achene, × 4, from Connecticut.

Reprinted from Rhodora, Vol. 40, Nos. 478–480, October–December, 1938

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

CXXIII

NOTEWORTHY PLANTS OF SOUTHEASTERN VIRGINIA

By M. L. Fernald

Dates of Issue

Pages 364–424 and Plates 509–520. . . . . 15 October, 1938
" 434–459 and Plates 521–530. . . . . 12 November, 1938
" 467–485 and Plates 531–535. . . . . 19 December, 1938

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CXXIII

NOTEWORTHY PLANTS OF SOUTHEASTERN VIRGINIA

M. L. Fernald

(Plates 509–535)

Part I. Itinerary of Four Field-trips

Renewing[1] our studies of the Coastal Plain of southeastern Virginia, again with our center at the Biological Laboratory of the University of Richmond, where we enjoyed the cordial and renewed hospitality of Professors Bailey and Smart and their associates and again had the efficient help of Mr. Carroll Williams, my companion in the Virginia work, Mr. Bayard Long, and I endeavored to start with the flora in spring and to keep interruptedly abreast with it until late autumn in 1937. The spring was not an advanced one but in early April (3–9) we collected more than 150 species in the area bounded by the outer Piedmont (along automobile Route 1) and the Dismal Swamp—at least 5 of the species new to Virginia, some (like *Draba brachycarpa* and *Sedum Nevii*) at probably their southeastern limits in the state, and still others (*Arabis virginica, Viola hirsutula, Obolaria virginica, Phlox nivalis* and *Plantago heterophylla*) certainly very local or rare in the area. We were induced to enter the Piedmont in southwestern Dinwiddie, northwestern Brunswick and southeastern Mecklenburg Counties because friends who are ordinarily keen observers had reported extensive sandy pine barrens in the last county, along Route 1. The ubiquitous heavy red clay and the ledges along the streams were, however, so unlike sandy pine barren that their report was obviously based on observations along some other route; possibly Route 158. Along the latter road, in eastern Southampton County, from about six miles south of Franklin to the Nottoway at Smith's Ferry, there occurs a considerable extent of pineland (in some places quite as defi-

[1] For preceding studies see Fernald & Griscom, *Three Days of Botanizing in Southeastern Virginia*, Rhodora, xxxvii. 129–157 and 167–189 (1935)—Contrib. Gray Herb. no. CVII; Fernald, *Midsummer Vascular Plants of Southeastern Virginia*, Rhodora, xxxvii. 378–413 and 423–554 (1935)—Contrib. Gray Herb. no. CIX; Fernald, *Plants from the Outer Coastal Plain of Virginia*, Rhodora xxxviii. 376–404 and 414–452 (1936)—Contrib. Gray Herb. no. CXV; *Local Plants of the Inner Coastal Plain of Southeastern Virginia*, Rhodora, xxxix. 321–366, 379–415, 433–459 and 465–491 (1937)—Contrib. Gray Herb. no. CXX.

nitely sandy pine barren as the area in Isle of Wight County), an area which, later in the year, gave us many surprises. On our last day in the field in early April we found our car bogged in particularly "slick" mud of the always "slippery when wet" Miocene clay, on a side-road. I undertook my part in attempting to lift the car out but, weakened by a severe attack of the grippe from which I had not wholly recovered, I strained my heart to such an extent that I was laid aside for repair and it was September (6–20) before I could renew the Virginia work. Long was with me and Carroll Williams, fortunately, could drive us and help us. I was, most happily, the personal guest during this trip of Dean and Mrs. Raymond B. Pinchbeck, whose true hospitality allowed me to go and come at all hours.

In 1886 the late Lester F. Ward stated that *Sabatia lanceolata* "was collected near Ashland, about seventeen miles north of Richmond. It was seen at one or two more southerly points";[1] and Merriman cites it from "Low pine lands" in his *Flora of Richmond and Vicinity*. We had never met this very characteristic species, now known as *S. difformis* (L.) Druce, anywhere in the state. In fact, it is not represented in the Gray Herbarium from between its northern limit, in southern New Jersey and Delaware, and eastern North Carolina; nor is it listed for Maryland and the District of Columbia. Our first day's exploration, in pouring rain, was, consequently, about Ashland and adjacent areas. The modern automobile route does not always follow the old road of Ward's time; at least we did not find *Sabatia difformis* nor any Coastal Plain types of note. We were in the border of the Piedmont and drove north as far as Milford in Caroline County, but the really noteworthy records were few, although *Sanicula Smallii* Bicknell, cited by Small (Man.) as occurring northward only to North Carolina, was in rich woods near Gum Tree, and the Asiatic *Celastrus orbiculatus* Thunb. grew in a dense tangle with native *Smilax* south of Milford. After this rather fruitless day to the north and at the edge of the Piedmont we stuck very faithfully to the Coastal Plain from Dinwiddie County to the North Carolina line, thence eastward to Nansemond, with an afternoon on the Peninsula of Virginia (Grimes's territory). As in April, the bottomlands of all the rivers were drowned, so that these rich habitats, upon which we had so much counted, were essentially inaccessible, though we did reach a few spots on the uppermost terraces and there added to the Coastal

[1] L. F. Ward, *Notes on the Flora of Eastern Virginia*, Bot. Gaz. xi. 36 (1886).

Plain flora such species of the interior as *Spiranthes ovalis* and *Solidago arguta.*

The pinelands and pine barrens, which we had seen south of Franklin in April, naturally soon attracted us. Here species which had previously been known in Virginia only at our station in Isle of Wight County were found: *Quercus laevis* the common oak; and *Stillingia sylvatica* and *Carphephorus bellidifolius* both abundant. The outer coastal sands of Princess Anne County were at once suggested by the abundance of *Triplasis purpurea, Panicum Commonsianum, Cyperus filiculmis* var. *oblitus* and *Quercus cinerea* (heretofore known in the state only on the dunes of Cape Henry). *Phlox nivalis,* unusually large, was locally abundant, here about 25 miles east of the eastern-most Viriginia station of Wherry;[1] *Asimina parviflora,* in fruit, was scattered; and much of the *Trichostema dichotomum* was the southern var. *puberulum* (heretofore known in the state only from Norfolk County). *Tradescantia rosea,* var. *graminea* (*Cuthbertia graminea* Small), locally very abundant, was new to the Virginia flora, as was *Stenophyllus ciliatifolius,* growing with it; and singular plants in *Desmodium* (Plate 523) and *Sanicula* (Plate 527) prove to be undescribed varieties. For many years *Chrysopsis gossypina* has been credited to Virginia, but I recently pointed out that I have seen no vouchers for the record; and Small, in his Manual, queried its occurrence so far north. We were, consequently, delighted, at the best station of *Phlox nivalis,* to walk into an extensive colony of something related to *Chrysopsis gossypina.* It proves, however, to be quite distinct from it in technical characters of achene, corolla and involucre and is evidently an endemic and undescribed species (Plate 531, figs. 1–4).

In our previous trips on the main road from Petersburg to Suffolk we had concentrated on a stretch of pineland northwest of Waverly. This time, noticing that the pineland immediately east of the town was partly unspoiled, we tried it and were rewarded by the discovery of a really extensive station of *Hypericum setosum,* with gigantic *Liatris spicata,* a plant of the interior, in Virginia and the Carolinas often on the higher mountains, but unrepresented in the Gray Herbarium as a pine-barren species except at the south, from Florida to Wilmington, North Carolina. With it, new to Virginia, was the large extreme of *Polygala cruciata* (var. *cuspidata* (H. & A.) Wood), the plant treated by Small as *P. ramosior* ("Fla. to La. and N. C.").

[1] Wherry in Bartonia, No. 11: 12, 13 (1929).

In southeastern Virginia *Oxypolis rigidior* is somewhat localized and apparently often an indicator of good pine-barren bog. Consequently when, just outside the town of Wakefield, we saw it in a small boggy depression we shouted for Carroll to stop. There was perhaps an acre of sphagnous depression, bordered on one side by low woods, on another by the road and on a third by a rapidly encroaching cultivated field. The bog cannot hold out much longer against destruction by man; in fact, the broadening of the road now going on is taking an important slice of it. With the obliteration of this bog there will be destroyed colonies of such great rarities as *Ctenium aromaticum* (we know only three colonies), *Dioscorea hirticaulis*, *Cleistes divaricata* and *Sarracenia purpurea* var. *venosa*. The destruction will also include our first colony in the state of *Erianthus compactus* and the first colony known north of North Carolina of *Paspalum praecox* var. *Curtisianum* (*P. lentiferum*).

We had never found southeastern Nansemond County, immediately west of the Dismal Swamp, of great botanical interest and Kearney's report gives few specialties from that region, though central and western Nansemond, from the region of Whaleyville to the Blackwater, is less ordinary. Perhaps we have not found the best spot; but upon the collecting-paper containing, as representative of the meagre flora, a *Panicum* or *Paspalum* fully mature but only 2 cm. high, Long expressed his emotions by writing "Sacred to the memory of Baines Hill School." But this half of Nansemond has, in reality, some really interesting plants; the difficulty is getting to them over the usually too "slick" back-roads. *Carphephorus tomentosus*, remarkably large and showy (up to 7.5 dm. high, with 40 blazing-purple heads) was frequent in wet pineland both east and west of Whaleyville. *Desmodium rhombifolium* was almost common; in one flooded cypress swamp we got typical *Potamogeton capillaceus*, new to Virginia; and in the border of dry woods northwest of Whaleyville we got a strange new *Lespedeza* (PLATE 424), looking like *L. hirta*, but with the technical characters of *L. capitata*.

In June, 1904, Dr. R. M. Harper observed from the moving train "on the Seaboard Air Line, . . . seven miles below Petersburg, a colony (containing probably several hundred individuals) of *Sarracenia flava* . . . the plants seemed to be growing in a sort of meadow, just as I have seen them in North Carolina."[1] Since *Sar-*

[1] R. M. Harper: *Sarracenia flava in Virginia*, Torreya, iv. 123 (1904).

racenia flava is an indicator of good things we hoped that this station would yield some novelties.

Computation showed that the area must be about a mile north of the Burgess railroad station; but the maps and our own exploration indicated no feasible approach except by walking up the track. Accordingly, when I felt that I was sufficiently toughened to undertake two miles of walking over railroad ties, we started for Burgess station. Shortly before reaching there we stopped at sight of a natural spring-fed pond with quaking sphagnous border, a very rare type of pond in southeastern Virginia. But there were conspicuous signs, "Private; keep out." These were a blight to our enthusiasm, but a comfortable old house crowned the slope to the south of the pond and we went there for permission. The colored attendant could give no authority for our botanizing; the owner had gone into Petersburg for the afternoon. There was nothing to do but assume a welcome! So, forgetting Harper's meadow, we waded and tumbled in the cold water until late afternoon, when it seemed the part of wisdom to go toward Burgess. The pond was covered with *Nuphar fluviatile* (a considerable extension northward), *Brasenia Schreberi*, the first we had got on the Coastal Plain of Virginia, and a naturalized water lily with roseate petals, the European *Nymphaea alba* forma *rosea*, introduced, we later learned, only a few years ago as four or five rhizomes but now crowding everything else. *Potamogeton* presented a puzzle and *Juncus repens*, extending its long submersed branches far out from the margin, baffled us until we traced it back to fruiting plants near shore. The boggy margin had nothing absolutely new to us but it was a pleasure to extend the local ranges of such rare plants as *Agrostis elata*, *Xyris ambigua* and *X. torta* var. *macropoda* and *Solidago graminifolia* var. *polycephala*. At last, fearing the return of a ferocious owner, we proceeded south. The old Burgess millpond was filled, at least near its outlet, with the relatively gigantic *Anacharis densa*, which, north to New York, occasionally spreads from aquaria but rarely becomes naturalized; here it had full possession.

The railroad, with its high embankments and its culverts, has nearly ruined the *Sarracenia flava* area north of Burgess Station. Only a few dilapidated plants persist, though the peaty and springy slopes and depressions furnished new stations for such nice things as *Rhynchospora cymosa* var. *globularis*, *Rhexia mariana* var. *purpurea* (*R. Nashii* Small), and *Eupatorium leucolepis*. Near-by, in dry pine

woods, was our first station south of Cape Charles and the Williamsburg region for *Gnaphalium obtusifolium* var. *micradenium;* and near it was *Silphium compositum* var. *reniforme* (*S. reniforme* Raf.), which Small cites from "Blue Ridge, N. C. and Appalachian shale slopes, Va." Dr. Perry, in her study of the group, saw only one specimen from the state, that from Bath County[1] at the extreme western border. The plant is relatively abundant at our station at the inner margin of the Coastal Plain, 125 miles to the east of the old Virginian station. In a springy and boggy clearing, where everything was oversized, *Digitaria Ischaemum* looked quite unfamiliar. I can make it nothing but var. *mississippiensis,* which Hitchcock cites only from "Maryland, Tennessee and South Carolina."

Returning toward Petersburg to spend the night, we selected as an attractive temporary home "Century House," on the land of which our spring-fed pond of the afternoon was located. The owner, Mrs. Bowman, instead of reprimanding us for trespass, urged us to continue our exploration of the pond next morning. So convenient were the quarters she gave us, so kind and ready to help were Mrs. Bowman, her son, Robert, and the general man about the place, William, and the most agile of colored boys, Isaac, that we at once conceived "Century House" as the ideal center for the next season's work.

Near the head of Nottoway Swamp, about midway between Sedley and Courtland, the topographic sheet shows a large pond with three antler-like narrow bays. It is there entered as Darden Millpond but, so far as we could learn, that name is forgotten and the present name is Predler's Pond. Our unvarying experience had been, that millponds have no broad natural beaches and botanically are quite uninteresting, being recent man-made habitats with no native specialities. Consequently, when we came to the broken-down dam at the outlet and saw above it miles of broad beach carpeted with vegetation, we knew that unexpected things awaited us. The regular plants of damp peat, sand and clay formed a turf 50 to 100 feet broad, with tiny and diffuse rills seeping down to the pond. Such species, local in Virginia, as *Eragrostis hypnoides, Axonopus furcatus* and *Panicum agrostoides* abounded, but we were more interested in the extensive patches of *Paspalum dissectum* and the superabundant *Oldenlandia Boscii,* the latter occurring as prostrate, freely branching plants up to 4 or 5 dm. across! *Oldenlandia Boscii* had been new to Virginia when, a year

[1] Perry in Rhodora, xxxix. 295 (1937).

before, we found tiny plants on the alluvium at Courtland; and the previous Virginian voucher for *Paspalum dissectum* had been a solitary starved individual from the silt of the Nottoway at Cypress Bridge. Best of all, *Digitaria serotina*, the first from the state, was here. The species was included by Hitchcock in the 7th edition of Gray's Manual from "s. Pa., Del., and southw."; but in his later Manual of the Grasses (1935) Hitchcock modified his statement of range to "Coastal Plain, North Carolina to Florida and Louisiana; Philadelphia (ballast); Cuba." By Predler's Pond it was an ingredient in the natural turf. The shore-line of Predler's Pond is two and a half miles long. In two hours we inspected one-tenth of that distance. *Paspalum dissectum* was seen only once, as we started from the outlet; *Digitaria serotina*, likewise, was noted only a single time, at the point where we felt that we must turn back. Much smaller Winter Pond in Middlesex County, Massachusetts, still yields previously undetected rare species after a century of botanizing. One brief visit to one-tenth of the beach of Predler's Pond has not exhausted its possibilities; but, unfortunately, we may never see it in the condition of 1937. In June, 1938, the dam had been reconstructed and absolutely no beach was in sight!

Driving toward Courtland for a long-delayed lunch, we came into unspoiled (except for some chopping) wet pineland. *Carphephorus tomentosus* was here and, although we were all nearly starved and it was mid-afternoon, we had to stop for the beautiful simple-leaved *Coreopsis* which grew at the border of the wet woods and in the ditches. Clearly the same as the plant of southwestern Nansemond which I had earlier identified and reported as *C. gladiata*, it was here more abundant than at our first station. In the past, the name *C. gladiata* has been variously used. Now that Sherff has monographed the genus, it becomes perfectly clear that the Virginian plant is not that species. Its achenes are unique and I am forced to recognize it as a very definite new northern member (Plate 533 and 534, figs. 1, 5 and 8) of a prevailingly more southern series. With this undescribed *Coreopsis* and a *Panicum* which is puzzling, there was a wonderful *Solidago*, which we had already found in low woods not far from the University of Richmond, a plant with large heads borne in slender one-sided wands which reach a length of 4 dm. or more, another species (Plate 532, figs. 1–4) which seems never to have been described.

After the experience with Predler's Pond we tried many other

ponds, usually with no luck; but, detecting on the contour-sheet a pair of tiny blue landlocked spots called Cat Ponds, not far from Benns Church in Isle of Wight County, we proceeded there. Most such little blue spots on the map had led us to small inundated bits of gum-swamp or other uninteresting depressions. One of the Cat Ponds was of this type, but the other (the larger) was a joy—a shallow pond with open beach a few rods wide, a good replica of the famous Cape Cod ponds. The pond itself was full of Maidencane, *Panicum hemitomon*, which in 1936 had been "new to Virginia." With it was very luxuriant *Sagittaria graminea*, the first we had ever met in eastern Virginia. The turfy beach had many of the regular pond-shore plants but there were enough others to keep us closely inspecting everything and watching for novelties until long after lunch-time. *Hypericum denticulatum* var. *oralifolium* was here abundant and safe from destruction, its previously known small station northwest of Homeville being in constant danger from fire and clearing. *Ludwigia sphaerocarpa*, var. *jungens*, which had been known in Virginia only at the type station, Cape Henry, where Griscom and I got it in 1933, was abundant; and two of the sedges specially pleased us: *Eleocharis melanocarpa* and *E. tricostata*, neither of which had been seen by Svenson, in his recension of the genus,[1] based on all accessible herbaria, from between southern Georgia and New Jersey. Cat Pond, like Predler's Pond, may repay other visits, at different seasons and in different years, and its owner, Mr. Hatfield, seems glad to have it weeded.

Planning to have a glimpse of Williamsburg and to dine there in the evening, we crossed the big James River bridge to the Peninsula of Virginia. This being the area which Grimes and his wife had so much explored and our time before dark being very limited, we could expect little of novelty. Suddenly, however, we were impressed by a tall plant with slender spikes in broad corymbs—*Verbena brasiliensis*, unrecorded from north of Wilmington, North Carolina. A bit of dry open woods gave us *Antennaria solitaria*, which the Grimes's reported only with doubt, and *Galium uniflorum*, new to the Peninsula; and one of the tiny pond-holes yielded *Erianthus strictus*, which a few days earlier had been "new to Virginia," and *Panicum spretum* and *Proserpinaca pectinata*, neither of them found by Grimes. In the twilight,

[1] See Svenson, Rhodora, xxxiv. 219 (1932) for the latter: ibid. xxxix. 270 (1937) for the former.

near Yorktown, we added three more plants to the flora of the Peninsula: *Setaria magna*, *Lippia lanceolata* and *Diodia teres*, var. *hystricina*. If we had only started at the beginning, instead of the end of the day, the known flora of the Peninsula of Virginia would have been vastly increased.

The last day of the season in the field was only a brief one. Just outside Homeville the superb *Crotalaria spectabilis* Roth[1] was beginning to flower; and near our station for *Houstonia tenuifolia* and other species isolated in oak and hickory woods a very strange grass attracted us. Obviously somewhat transitional between *Paspalum* and *Panicum*, it belongs with the wholly anomalous *Paspalum bifidum* (Bertol.) Nash, heretofore unknown north of South Carolina. The Virginia plant differs, however, in several characters from the more southern extreme and constitutes a good isolated variety (Plate 509).

Early spring in southern Virginia was phenomenally advanced in 1938. We had watched for some weeks the daily records from Norfolk of summer temperatures. Consequently, when we reached Century House, south of Petersburg, we were not surprised to find that, early in April (2–10) spring was already fully on. Woodlands were splendid with *Wisteria*, *Cercis*, *Pyrus* (§ *Malus*), *Crataegus*, *Cornus florida* and *Rhododendron* (§ *Azalea*) in full bloom. The earliest-flowering herbs (*Alopecurus carolinianus*, *Luzula bulbosa*, *Holosteum umbellatum*, *Cerastium viscosum*, *Cardamine hirsuta*, *Arabis virginica*, *Veronica persica*, etc.) were already scattering their seeds. Since Carroll Williams was unable to join us and Robert Bowman was regularly employed, we had asked Mrs. Bowman to secure a driver and helper for us. She had most wisely selected Meade Lewis, a young man all his life familiar with the woods, with the eye of a trained hunter and skill in driving such as one rarely meets. We soon had him closely watching the woods and thickets and he took keen delight when he was first to see something new to us, remarking: "It isn't fair! You two have nothing to do but watch the woods, but I have to keep on the road, avoid drunken drivers and do the botanizing." When we found tiny plants, like *Myosurus minimus* and *Plantago heterophylla*, growing in a field with *Poa Chapmaniana*, *Sagina decumbens*, and other dwarf species, all we had to do was to give a sample to Meade and ourselves start the hunt for something else, knowing that he would collect the needed series. *Buxbaumia aphylla*,

[1] See Larisey in this no., 361, pl. 508.

the essentially leafless moss with fruits only 2 or 3 mm. long, was his great joy; and, as we were hunting for it in the pinelands south of Zuni, we could hear his shout, "Here's more of that bed-bug moss. Gee! these are giants!"

The hot early spring with little rain, following a dry and essentially frostless winter, had made the bottomlands and big swamps quite accessible, whereas in 1937 they had been flooded; but the day before we arrived heavy rains had come and these continued interruptedly during the trip. Frosts were now frequent and three mornings ice formed on small pools. The vegetation, although slowed down, was, fortunately, not much injured; we could tramp in complete comfort, except for the rain; and a furnace-fire was maintained at the house, so that our ventilated presses were stacked upon the radiators, giving ideal drying conditions. Many species not represented in northern herbaria by good flowering material were collected and we soon became active at our old game of finding species new to Virginia.

Just as in April of the year before, neglected cotton-fields were carpeted with a dense growth of quickly maturing winter-annuals, now in anthesis or in fruit. In such transient habitats the dwarf *Ranunculus parviflorus* was fruiting, *Myosurus minimus* and *Plantago heterophylla* closely simulated one another, *Poa Chapmaniana* was expanding its slender panicles, *Arabis virginica* was fruiting (impressing us as neither an *Arabis* nor a *Cardamine*), and *Spergula arvensis* var. *sativa* (new to Virginia) was frequent. In one old field, where, a year earlier, some of these species abounded, they were now wanting and their place was taken by *Holosteum umbellatum* which we did not see the year before. The quick-growing weeds, however, were not confined to old cotton-fields. Stopping on the "soft-shoulder" of a road to investigate a leaking tire, we found ourselves in an abundance of *Teesdalia nudicaulis* (L.) R. Br., a European species, evidently included with the seed of European *Lolium perenne*, which was extensively planted along the new roadsides. Again, stopping in Wakefield to make an inquiry, we noticed that the annual *Cerastium* of the worn-out grassland was not the ubiquitous *C. viscosum*. In this case it was the European *C. tetrandrum* Curtis, heretofore not recorded as American.

The hoary-pubescent *Plantago virginica* was scarcely in flower; but, associated with it or exclusively occupying areas of dry sand or clay, there was a small and green *Plantago* in full flower or even in fruit.

This puzzled us, for we knew of no relative of *P. virginica* which it could be. In Part II I shall further discuss it (Plate 530, figs. 4–6).

We stopped for a brief check of the sandy pine barrens of Isle of Wight County, not expecting additions, but for the joy of seeing *Pyxidanthera* in full flower and because the area is one of fascination and real individuality. *Carex pensylvanica* and *C. tonsa* abounded and, slightly southward (near Walters), there were carpets of *C. umbellata*. These would hardly stir the enthusiasm of a botanist of New England, Pennsylvania and New Jersey; but, singularly enough, all three make their debuts as members of the Virginian flora, Mackenzie (in N. Am. Flora) having seen none of them from the state!

The bottomlands, as already noted, were dry and quite accessible, carpeted with great flowering colonies of *Podophyllum*, fruiting ones of *Sanguinaria* and innumerable violets. On many of the richer bottoms *Senecio aureus* was in full bloom, amazing to a northerner, who has known the northern plant of swamps and peaty thickets, through its gigantic size and the *thick, elongating, purple basal offshoots*. The plant of these bottoms is true *S. aureus* of Linnaeus; perhaps the northern and transcontinental plant is wrongly identified with it. On the bottoms generally *Ranunculus abortivus*, pale-green and with characteristically cleft cauline leaves, abounds; but along the Nottoway and its tributary, Three Creek, it is chiefly represented by a plant with lustrous dark-green and quite undivided cauline leaves, a striking and apparently quite localized variety (Plate 518) which will be further considered in Part II.

The patch of rich, deciduous woods slightly east of Emporia, near Metcalf Branch, had, in previous seasons, yielded good results. On the bottomland itself we had previously collected *Hydrangea arborescens* and fruiting specimens of a small tree which we took to be *Aesculus discolor* Pursh, then new to Virginia. In early April, 1938, the latter was freely flowering, both in the bottomland woods and higher up; its identity is now established. *Clematis ochroleuca* was flowering in the dry woods; *Corcopsis auriculata* was recognizable, though young; and, on the bottomland we got our only collection on the Coastal Plain of *Phacelia*, in this case the beautiful *P. dubia*, a plant chiefly of the interior. In May, 1935, Griscom and I had been much impressed by the exceedingly long peduncles of the staminate spikes which characterized *Carex digitalis* on Little Neck in Princess Anne County. In the rich woods east of Emporia the same plant

abounds and it has subsequently proved to be typical of such habitats on the Coastal Plain of Virginia, thence southward. It so far departs from true *C. digitalis* as to merit recognition as a southern variety (PLATE 511, FIGS. 3 and 4).

Slightly north of Emporia, in the rich woods along Three Creek, where *Saxifraga virginiensis, Hystrix patula* and some other inland species reach the margin of the Coastal Plain, there is a rich development of *Viola*. Among the complex series we got the southern *V. esculenta* Ell., heretofore known in the state only from a single station in Norfolk County. Farther down Three Creek, near Drewryville, the violet-population contained the characteristic *V. Langloisii* Greene var. *pedatiloba* Brainerd, previously known only from Louisiana; and about spring-heads in rich woods slightly east of Drewryville the essentially northern, rather than southern, *Lycopodium lucidulum* hides under abundant clumps of *Dryopteris celsa* (Wm. Palmer) Small of the Great Dismal Swamp.

Rich loamy woods were evidently the habitat where the best botanizing was to be found in early spring; consequently, with the hope of finding on the Coastal Plain other stations for plants of the interior, we started for the rich slopes and gullies along the James near Claremont. On the way we were attracted by the lush vegetation on the bottomland of Powell's Creek, near Garysville. The inland *Sedum ternatum* here made extensive mats; and on the dry wooded slopes were other plants of the interior: *Stellaria pubera, Anemonella, Hepatica americana, Chrysogonum virginianum* and several others. Our best area, on this trip, however, was near Claremont. Here the fossiliferous sands and clays are near the surface and the banks of streams and the wooded gullies conspicuously display them. Calcareous springs and rills abound and the freely available "marl" and the friable soil support rich forests of *Ulmus fulva, Asimina triloba, Juglans cinerea, Fraxinus americana, Tilia heterophylla* and *Michauxii* and many other trees and shrubs hardly characteristic of the Coastal Plain. On the wooded slopes *Hydrangea arborescens* abounds and *Menispermum canadense* twines with *Vitis vulpina*. The herbaceous flora is as rich as one could ask, with *Orchis spectabilis, Aplectrum hyemale, Cimicifuga racemosa, Dentaria laciniata, Heuchera americana, Thaspium barbinode, Obolaria, Nemophila microcalyx* and *Antennaria solitaria;* and in one gully *Hybanthus concolor* forms almost a thicket, nearly a meter high!

The calcareous rills in the woods near the head of Sunken Meadow, slightly south of Claremont, are bordered by a tall and broad-leaved *Scirpus* which was quite strange to us. In early April it was coming into bloom; in mid-June, when we again collected it, it was shedding its achenes. Suggesting the Coastal Plain *S. divaricatus*, it is coarser, with axillary as well as terminal umbels and with distinctive spikelets, scales and fruits. It proves to be the very rare and little known *S. fontinalis*, described by Harper from calcareous wooded spring-heads in Georgia. Here, in a single but extensive calcareous area tributary to the James, it abounds with Alleghenian species which intrude into the Coastal Plain from the west. So far as known it has not been detected between Georgia and Virginia!

It was two months before Long and I could return to Virginia. Rain had poured down on the already drenched land and continued to do so during much of our field-work (June 8–19). Vegetation was luxuriant and all but the bottomland species were prospering. The latter were hopelessly submerged, though we did succeed in extracting from the flooded bottomlands of the Nottoway and the Meherrin fine flowering series of Acanthaceous herbs (*Justicia* and *Ruellia*); and on the bottomland of the Meherrin about Haley's Bridge there was another member of the family which is surely not in Gray's Manual. Its identity must await the collection of flowering or fruiting material. This special bottomland was the only one on which we could get much accomplished. In 1936 we had got, along with the endemic *Carex crus-corvi* var. *virginiana* Fernald (in Rhodora, xxxix. 393, pl. 476, figs. 1–5), a representative of *C. vulpinoidea* with blue-green (instead of yellow-green or golden) tones. It was important to get more; so, after a visit to Hart's Bridge in southern Southampton County, we swung over to Haley's Bridge. The water, in the late afternoon of June 16th, was low enough on the flood-plain for us to travel easily, although shrubs and herbs all bore a heavy crust of alluvial mud and silt. While collecting further material of the two *Carices* we were diverted by a strange flexuous and membranous-leaved *Scirpus*, trailing or reclining at the margins of the bottomland creeks. Its inflorescence suggested that of the common erect and densely cespitose *S. atrovirens* var. *georgianus* (Harper) Fernald, but the rhizome was elongated and it bore only a solitary culm from the crown formed the preceding year. So consistent was the plant in its elongating rhizomes, solitary weak and trailing culms and flaccid, smooth leaves that we

collected it until ominous thunder indicated the necessity to start for Emporia and supper.

Returning on the 18th for better material of the strange new *Scirpus* and to retrieve the specimens of *Carex crus-corvi* var. *virginiana* which, in our haste of two days before to get under cover, had been left behind, we started lower down, nearer the Bridge. *Carex caroliniana* Schwein., the first we had seen in Virginia, was overripe but recognizable, the culms reaching the phenomenal height of 1.65 meters. *Euphorbia obtusata*, in past years always scarce, was here abundant. The ditch along the road through the wooded bottomland had, to us, a strange appearance, from the ripe heads of *Serinia oppositifolia*, the first station known north of South Carolina. In the woods *Arisaema Dracontium*, the last plant one would look for on the Coastal Plain, was vigorously developed; and green rosettes were certainly those of *Spiranthes ovalis*, not yet in flower. In 1936[1] I showed that one of the commonest grapes of southeastern Virginia is *Vitis cinerea*, var. *floridana* Muns. (*V. Simpsoni* Muns.), although it had been supposed not to extend north of southern Georgia. Here, at Haley's Bridge, however, it is represented by the silvery-tomentulose typical *V. cinerea*, in the East not supposed to occur north of Florida. Reaching the *Scirpus* station we were chagrined to find it under four to six feet of water. That part of the bottomland was again not to be explored this trip (nor, as it proved, during the July trip).

Starting back to Emporia, with a feeling of partial defeat, we stopped at an extensive peaty clearing, to collect "anything else" before supper-time. And the anything else this time proved to be a slender branching *Polygala* with the habit of *P. verticillata* var. *ambigua*, but with the relatively showy milk-white racemes composed of much larger flowers, with wings 2–2.6 mm. long and much overtopping the capsules. Perfectly typical *P. verticillata* (*P. Pretzii* Pennell) grew near-by, as well as characteristic *P. verticillata*, var. *ambigua*, with every transition one could ask for, but the plant with larger white flowers was a stranger (PLATE 525, FIGS. 1 and 2). It proves to be an extreme of the species represented in the Gray Herbarium only from Missouri, Arkansas and Oklahoma—a geographic relationship now very familiar to us in eastern Virginia.

We had gone to Haley's Bridge via Hart's Bridge (south of Sunbeam) and Statesville, because in April we had seen in rich woods

[1] RHODORA, XXXVIII. 426 (1936).

between Hart's Bridge and the North Carolina line young leaves of what we took to be *Sanicula Smallii*. The flowering and fruiting plants were very typical—a very definite species with subcoriaceous leaves and tuberous-thickened roots. At the border of sandy woods at Hart's Bridge I was attracted by a strange grass. It proves to be *Panicum chrysopsidifolium* Nash, which Hitchcock (Man.) indicates only from Texas, Arkansas, Louisiana and Florida; and near-by, stimulated by the perpetual irrigation and manuring of the weeks of freshet, *Crotalaria Purshii* was growing to a height of 4.5 dm.

But to begin at the beginning. Our first day's field-work in June had progressed only a few minutes, when, south of Petersburg, we were amazed to find *Juncus brachycarpus* abundant in almost any argillaceous swale. This very definite species, simulating the mid-summer and autumn *J. scirpoides* but with short and broad capsules and soft, instead of acerose, perianth-segments, has been considered one of the rarest of rushes on the Atlantic slope; but in June, in south-eastern Virginia, it was seen everywhere we went and in July we found it (over-ripe) northward to the Gloucester Peninsula. It becomes highly probable that its reputation for rarity is due to its early maturing and later being mistaken for old and passé inflorescences of the common *J. scirpoides*. Barely three miles south of Petersburg, along the tracks of the Atlantic Coast Line, there are some wet argillaceous depressions which proved fascinating. The best find here was an almost black-headed *Eleocharis*, strange to us. In rhizome and habit it is *E. capitata* (*tenuis*) but the very dark and coarsely pebbled achenes with strongly depressed tubercles are a close match for those of *E. capitata* var. *verrucosa* Svenson, which its author had seen only from the Mississippi Basin.

Space does not permit recording all the thrilling (and disappointing) days. Visits to localities already known to be good yielded additional rarities: the swale north of Littleton, which is still our only station for *Polygala ramosa*, supplying *Acerates floridana*, apparently the first in the state, and a really definite new blackberry (*Rubus*) of the *cuneifolius* series, but with depressed habit, acuminate leaflets and many other distinctive characters (Plates 521 and 522); the area north of Emporia, where, in 1936, Griscom, Long and I found *Schwalbea americana*, yielding our first station for the long-sought *Drosera brevifolia;* a similar but drier area of pine and oak woods at the boundary between Greensville and Sussex Counties supporting

Schwalbea in great abundance and a good colony of *Eryngium yuccifolium;* the margin of Somerton Creek with the tropical *Pontederia lanceolata* Nutt. forma *brasiliensis* (Solms) Fern.,[1] the first from north of Florida; and the springy thicket north of Factory Hill (type-locality of the slender *Coreopsis* noted above) with the first colony of *Erigeron vernus* known to us in Virginia except back of the dunes of Princess Anne County.

Other localities deserve fuller notes; I will restrict myself to four limited ones and a fifth of more generalized character. The white-sandy open pine and oak woods and barrens between Franklin and Smith's Ferry yielded in September, 1937, a remarkable group of novelties. In June such habitats are not likely to display much of distinctive character. However, stopping to look over the type station of the new *Chrysopsis* related to *C. gossypina*, we were impressed by the presence there of low thickets of *Comptonia*, the Sweet Fern, the first we had ever met on the Coastal Plain of Virginia. Always familiar with what in New England and eastern Canada we call *Comptonia* (or *Myrica*) *asplenifolia*, I was greatly impressed with the small and glabrous foliage, the non-pilose branchlets and the tiny fruiting aments of the shrub south of Franklin. Comparison in the herbarium shows that there are two strongly defined varieties in the species: one of wide range across southern Quebec and Ontario, thence south across the Maritime Provinces and the northern states and locally southward in the interior of the continent, a shrub with pilose or villous new branchlets, more or less pubescent foliage, large fruiting aments and other characters to be discussed in Part II (PLATE 514, FIGS. 7–10); the other a pine-barren shrub, the small extreme (PLATE 514, FIGS. 1–6) in southeastern Virginia, also in the pine barrens of New Jersey and Long Island. Linnaeus proposed two species for these shrubs: *Liquidambar peregrina*, "*Habitat* in Canada," obviously the common northern shrub; and *Myrica asplenifolia* "*in* America *septentrionali*," with numerous literary references. One was to Gronovius. In so far as the Clayton plants (Gronovius) were involved they were presumably both the varieties. Most happily, Clayton, recognizing the rarity in his region of the shrubs, specially noted the localities: "In Comitatu Lancastriae crescit, & ad ripam saxosum praeruptum fluminis Northanna in opacis sub abietum tegmine initio Junii absque indiciis fructificationis reperi." Presumably

[1] See RHODORA, XXVII. 81 (1925).

Clayton's material from Lancaster County is like the Southampton County shrub; with equal probability his shrub from steep shaded slopes by North Anna River (well back in the Piedmont) is the wide-ranging one.

With the *Comptonia* and the *Chrysopsis*, *Stillingia sylvatica* was superabundant, its crowns producing several ascending branches with lustrous leaves and, in mid-June, tipped by the slenderly conical yellow-green inflorescences. Farther south, at our original Virginia station for *Tradescantia rosea* var. *graminea*, *Cirsium repandum*, the first known from Virginia, was blooming; and near a fine thicket of *Phascolus polystachois* there was a strange *Physalis*, with young flowering buds. Most of the area where the latter originally occurred is cleared and under unsuccessful cultivation (chief crop uninvited *Opuntia*), so that the *Physalis* is now very rare. Two fruiting plants collected in July show it to be *P. monticola* C. Mohr, heretofore supposed to occur only in the mountains of Alabama.

The small patch of rich deciduous woods by Metcalf Branch, east of Emporia, always yields something interesting; and in June we were humiliated to find that one of the most abundant trees there is *Acer floridanum* Pax. We had previously been so absorbed in the herbaceous vegetation that we had not noted the maple. Small, under *Saccharodendron floridanum*, gives the range: "Fla. to La. and S. C. Naturalized in N. C. Reported from Va." The report is that of Sargent (Man.) from Dinwiddie County. Surely *Acer floridanum* is indigenous east of Emporia and in its shade, besides local species already enumerated (p. 374), are *Silene virginica* (the only time we have seen it on the Coastal Plain in the state), *Carex flaccosperma* (plants either yellowish- or blue-green) and *Rosa carolina* var. *glandulosa* (Crépin) Farwell, which is certainly not common. Descending to the bottomland (the day we were there well dried out) of Metcalf Branch we were much impressed by the tall blue-green clumps of a *Glyceria*, with broad and flaccid horizontally divergent ribbon-leaves with long ligules and elongate panicles of reflexed branches, suggesting the panicle of *Milium effusum*. We were so impressed with this strange grass that we collected and carefully laid out nearly 20 sheets. It is fortunate that we did so, for it is very typical *G. arkansana* Fernald, described from Arkansas and Louisiana. Slightly to the east, on the slope of spring-fed woods, where *Carex Collinsii* (second station in the state) abounds, there are splendid trees of *Fraxinus biltmoreana*,

assigned by Small (Man.) to "Blue Ridge to Appalachian Plateau." The *Fraxinus* also occurs on the Coastal Plain in Dinwiddie County, at one of the first Coastal Plain stations for *Phlox carolina*, var. *triflora* (Michx.) Wherry.

Not far from Stony Creek in Sussex County there are rich woods, with a Piedmont flora. On this trip we got there *Woodsia obtusa* (the first station known to us on the Coastal Plain) and *Scrophularia lanceolata* Pursh, a trans-continental and northern type, which Pennell (Scroph. E. Temp. N. Am.) had seen only from the Blue Ridge and the Alleghenies in Virginia. The road from Stony Creek to Sussex Courthouse goes through much unspoiled and botanically productive country. The most distinctive feature, perhaps, is the great development of almost savannah-like swales in the open woods bordering the swamps of the Nottoway. One such swaley area was given over, in June, to a few species, making a solid swale of many acres: *Carex Barrattii* (not seen by Mackenzie from Virginia), *C. bullata* (do.), *C. Buxbaumii* (do.), *Panicum scabriusculum* and *P. consanguineum* and *Juncus Elliottii*. No plant with showy flowers was seen there in June. We are looking forward to possible novelties in August and September.

We invited Professors A. B. Massey of Blacksburg and Robert Smart of Richmond to join us for a week-end. Unfortunately Smart was under the weather (being too accustomed to it) at the time and Massey was crowded with routine work. We had his companionship for a too brief morning and, time being limited, we decided on trying the Waverly region, as the most accessible area of sandy pinelands. Long and I hardly expected novelties from an area much investigated, but, fortunately, we left the car at a new spot. The woods had, besides the familiar pineland types, a most definite *Sisyrinchium*, erect, with filiform leaves and a pair of spathes, *S. capillare* Bicknell, a Coastal Plain species not recorded from so far north; and the wet depression, now filled with water, was largely given over to *Rhynchospora perplexa* Britton, another species unrecorded from north of North Carolina.

Unfortunately Massey had to leave before lunch, in order to make Blacksburg before dark (foreseeing inevitable rain); so that we were obliged to continue the day without him. Being only a few miles south of Claremont and wishing to get mature material of the strange *Scirpus* (*S. fontinalis*) found in April we proceeded there; and on this

and two succeeding days we had all we could handle in the neighborhood of Claremont, where the highly fossiliferous sands and clays support as rich and luxuriant a vegetation as any on the Coastal Plain. The flora is, however, definitely not a typically Coastal Plain one; it is of the Blue Ridge and the Appalachian Upland, as we had already noted in April (p. 375). We collected in three areas in June: in the woods along upper waters of Sunken Meadow Creek (south of Claremont), in the gullies and back of the beach of the James at Claremont Wharf, and, a few miles down river, in similar habitats below Sunken Meadow Beach. All three areas were similar in physiognomy and very near together; yet each had its own specialties (and in July all other spots examined in the fossiliferous Miocene beds were similarly found to have marked individuality). All three areas had *Bromus purgans*, typical *Ostrya virginiana* (with glabrous twigs), *Laportea canadensis* (making botanizing most uncomfortable), *Menispermum canadense*, *Cryptotaenia canadensis* and *Sanicula gregaria*. Only in the woods at the head of Sunken Meadow Creek did we see *Scirpus fontinalis*, *Symplocarpus foetidus*, *Thalictrum revolutum*, *Euonymus atropurpureus*, *Thaspium barbinode*, *Collinsonia canadensis*, *Viburnum acerifolium*, *Eupatorium purpureum* (*E. trifoliatum*), *Silphium atropurpureum*, *Coreopsis auriculata* and *Heliopsis helianthoides*. A few miles to the north, at Claremont Wharf (on the James) we found our only station in the region for *Adiantum pedatum* (stipes up to 6.5 dm. high), though it is probably general in the region, *Athyrium thelypteroides* (fronds up to 1.25 m. high), *Brachyelytrum erectum*, *Elymus villosus*, typical (only forma *arkansanus* at the head of Sunken Meadow Creek), *Carex bromoides*, *Frankii* and *Grayii*, *Smilax pulverulenta*, *Quercus borealis* var. *maxima*, *Caltha palustris*, *Tilia heterophylla*, *Hybanthus concolor* (very abundant in the gully with *Dryopteris celsa*, *Athyrium thelypteroides*, *Scutellaria versicolor*, etc.), *Aralia racemosa* and *Teucrium canadense* var. *virginianum*. Down river a few miles, in similar habitats below Sunken Meadow Beach, other notable (for the Coastal Plain) species were localized: *Deschampsia flexuosa*, *Smilax hispida*, *Quercus montana*, *Arabis laevigata* (in great profusion and luxuriance), *Sedum ternatum*, *Physocarpus opulifolius*, *Staphylea trifolia*, *Hypericum prolificum* (in July found in great abundance in woods of Flowerdew Hundred, the shrubs there up to 2.5 m. high), *Fraxinus americana*, *Agastache nepetoides*, *Stachys Nuttallii*, *Conopholis americana*, and *Houstonia longi-*

folia. At both Claremont Wharf and Sunken Meadow Beach some specialties were found: *Dryopteris celsa* (rare at the latter, superabundant and up to 1.2 m. high in a gully and adjacent cypress swamp at the former locality), *Populus deltoides*, *Cimicifuga racemosa*, *Astragalus canadensis*, *Osmorhiza longistylis* var. *villicaulis* and *Scutellaria versicolor*. In July many of these species were seen still farther down the James, at Eastover. Surely this portion of the Coastal Plain is a tongue of the Appalachian Upland pushing far to the southeast. But at Sunken Meadow Beach one plant was found which, thus far, is known only from a single spot. It is a *Coreopsis*, related to the commonly cultivated *C. grandiflora* and *C. lanceolata* but differing in many striking characters. So far as I can make out it is an undescribed species (PLATE 535, FIGS. 1–9).

In the gullies and brook-valleys north and northwest of Surry the fossils are sometimes near the surface; consequently there is another localized series of species. The best of the areas we found was a gully, heavily wooded with beech, with the undergrowth principally *Dirca palustris*. This is the only place we had ever met *Dirca* in eastern Virginia; and neither of us had ever imagined such domination of a forest-floor by it, tree-like shrubs up to 3 m. high, with the larger trunks 7 cm. in diameter. Adding to the relatively boreal aspect was a fine colony of the very characteristic *Antennaria munda* Fernald in RHODORA, XXXVIII. 229, plate 433 (1936). This species is characteristic from central Maine and southern Quebec to the region north of Lake Superior, south to Massachusetts, Connecticut, northeastern Pennsylvania, etc. Looking from it through the trunks of *Dirca* and *Fagus*, and noting our only colony of *Dennstaedtia punctilobula* at the border of the woods, one might think himself in western New England; but the thousands of plants of *Ponthieva racemosa* at the bases of the slopes would quickly bring him back to the South.

I have summarized some of the "high lights" of our Virginian work up to the summer trips of 1938. The discussion of problems arising from the latter most necessarily be postponed. They are still yielding abundant results, and on the July trip we were gratified to rediscover at least two species (*Burmannia biflora* and *Aeschynomene virginica*) unknown in the state since their discovery by Clayton. There is plenty to do; there are too few equipped to do it.

Part II. Enumeration of Significant Species

In the following enumeration the plan of former papers is followed, of listing stations for rare or local plants and of discussing novelties which have come to attention during the working-up of the Virginia collections. Some collections of previous years are included; while many species of the recent collections are not here noted, their exact identification awaiting further study. In general, no new species collected during the summer of 1938 are included, although records from the miscellaneous material from these trips are given whenever their inclusion has caused no appreciable delay in finishing the present paper.[1] Plants apparently new to the flora of Virginia are indicated by an asterisk (*). The field work in September, 1937 and in April and June, 1938 was made possible through a special grant from the Milton Fund for Research of Harvard University; that carried on in the summer and autumn of 1938 through an anonymous gift from a generous friend to aid phytogeographic research. The plates are largely the work of Dr. E. C. Ogden or of Henry G. Fernald, the cost of the photography and the making of the blocks largely defrayed from a grant for research from the Division of Biology of Harvard University. The cost of printing the plates has most generously been met by my loyal companion on all the recent work in Virginia, Mr. Bayard Long.

Woodsia obtusa (Spreng.) Torr. Sussex County: rich wooded slope, 4 miles south of Stony Creek, *F. & L.*,[2] no. 8000. Prince George County: rich woods, Coggins Point, no. 8910. See p. 381.

Apparently the first records from the Coastal Plain of Virginia.

Dryopteris celsa (Wm. Palmer) Small. To the few stations recorded add Southampton County: about spring-heads in rich deciduous woods east of Drewryville, abundant, no. 8005. Surry County: rich calcareous wooded gullies and adjacent cypress swamp, by James River, Claremont Wharf, thousands of plants with fronds up to 1.2 m. long, no. 8006; rich wooded gullies along James River, below Sunken Meadow Beach, no. 8007. See pp. 375, 382, 383.

[1] Additional stations for many of the rare plants recorded in this paper (*Dryopteris celsa*, *Paspalum dissectum*, *Erianthus strictus* and *brevibarbis*, *Rhynchospora perplexa*, *Ponthiera racemosa*, *Pyrus serotina*, *Dirca palustris*, *Oldenlandia Boscii*, etc.) but discovered too late for inclusion must await the publication of another article.

[2] The same abbreviations of collector's names are used as heretofore: *F. & G.* (*Fernald & Griscom*); *F. G. & L.* (*Fernald, Griscom & Long*); *F. L. & F.* (*Fernald, Long & Fogg*); *F. L. & S.* (*Fernald, Long & Smart*). The abbreviation *F. & L.* (*Fernald & Long*) for the collectors of most of the cited numbers will be omitted, as quite unnecessary.

ATHYRIUM THELYPTEROIDES (Michx.) Desv. SURRY COUNTY: rich calcareous wooded gullies by James River, Claremont Wharf, thousands of plants forming a pure growth, with fronds up to 1.25 m. long, no. 8009. See p. 382.

Apparently the first record from the Coastal Plain of Virginia.

DENNSTAEDTIA PUNCTILOBULA (Michx.) Moore. SURRY COUNTY: beech woods, slopes of gully 1½ miles north of Surry, no. 8001. See p. 383.

Rare on the Coastal Plain of Virginia.

ADIANTUM PEDATUM L. Occasional in rich woods.

The colonies in the rich gullies at Claremont Wharf have stipes of unusual height (up to 6.5 dm.). See p. 383.

EQUISETUM HYEMALE L., var. AFFINE (Engelm.) A. A. Eaton. Extended eastward from Surry County to NANSEMOND COUNTY: marshes along Western Branch, Everett's Bridge, no. 7186.

LYCOPODIUM LUCIDULUM Michx. SOUTHAMPTON COUNTY: rich woods about 2½ miles east of Drewryville, no. 7746 (station discovered by our driver, *Meade Lewis*). See p. 375.

Very rare on the Coastal Plain; collected by Grimes near Williamsburg.

L. TRISTACHYUM Pursh. Extended south to SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, no. 7192.

POTAMOGETON CRISPUS L. SURRY COUNTY: brook in drained cypress swamp, Claremont Wharf, no. 7747.

*P. CAPILLACEUS Poir. NANSEMOND COUNTY: sandy and peaty margin of Norfleet Pond, northwest of Whaleyville, no. 7198. See p. 367.

SAGITTARIA GRAMINEA Michx. ISLE OF WIGHT COUNTY: abundant and chiefly immersed in Cat Pond, south of Benns Church, no. 7200. See p. 371.

Not cited from Virginia by J. G. Smith, Revis. N. Am. Sp. Sagittaria and Lophotocarpus (1894); but recorded from the Potomac in the Flora of the District of Columbia.

*ANACHARIS DENSA (Planch.) Victorin. DINWIDDIE COUNTY: dominant in argillaceous margin of millpond, Burgess, no. 7203. See p. 368.

BROMUS PURGANS L. Extended eastward to SURRY COUNTY: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8030; seen eastward to below Sunken Meadow Beach. See p. 382.

*GLYCERIA ARKANSANA Fernald. GREENSVILLE COUNTY: gum (*Nyssa aquatica*) swamp, bottomland of Metcalf Branch, east of Emporia, no. 8036. SURRY COUNTY: shallow water of gum swamp, Blackwater River, south of Savedge, no. 8037. Doubtless in other gum swamps. See p. 380.

Seemingly a very notable extension of range. The last epitome, Hitchcock's Manual, cites *Glyceria arkansana* only from Louisiana, Arkansas and Texas. The lemmas, membranaceous, minutely scabrous-puberulent and very prominently veined, may reach a length of 4.3 mm. The ribbon-like blue-green leaves are very striking in being horizontally divergent. The panicle-branches are soon reflexed, giving the inflorescence the aspect of that of *Milium effusum*. As a matter of fact *G. arkansana* is now represented in the Gray Herbarium from western New York (Rhodora, xxxv. 294) and a sheet from northwest of Glencoe, Illinois (June 12, 1911, *Sherff*) seems to be it.

Poa Chapmaniana Scribn. Southampton County: weed in old cotton-field southwest of Franklin, no. 7750. Greensville County: similar habitat south of Emporia, no. 6941. See pp. 372, 373.

P. cuspidata Nutt. Rich woods generally, eastward to Surry County.

*Eragrostis peregrina Wieg. Caroline County: cinders of railroad ballast, Penola, no. 7207.

*Dactylis glomerata L., var. ciliata Peterm. Surry County: roadside, Claremont Wharf, no. 8043.

The extreme of the variety, with the lemmas dorsally pilose.

Arundo Donax L. Sussex County: a good colony, 3.5–4.5 m. high, in roadside-dump by a moist thicket, Wakefield, no. 7204.

Melica mutica Walt. Frequent in rich woodlands eastward to Dinwiddie and Greensville Counties, more local to Surry County (rich wooded slope at head of Sunken Meadow Creek, south of Claremont, no. 7755) and Nansemond County (wooded slope, Kilby, no. 6948).

Triplasis purpurea (Walt.) Chapm. Southampton County: dry sand, pine barrens about 7 miles south of Franklin, no. 7210. See p. 366.

The species chiefly coastal with us.

Elymus villosus Muhl. Surry County: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8021; seen at Eastover. See p. 382.

E. villosus, forma arkansanus (Scribn. & Ball) Fernald. Surry County: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8022. See p. 382.

E. riparius Wieg. Greensville County: rich deciduous woods by Three Creek,[1] north of Emporia, no. 8023.

[1] Owing to the new trunk-line automobile-roads often departing from the old wagon-roads we mistook this station by Three Creek and many duplicates from there have been erroneously distributed as from Maclin's Creek, which is slightly more to the west.

HYSTRIX PATULA Moench. GREENSVILLE COUNTY: with the last, no. 8029. PRINCE GEORGE COUNTY: rich woods, Coggins Point, no. 8960. See p. 375.

DESCHAMPSIA FLEXUOSA (L.) Trin. SURRY COUNTY: rich wooded gullies along James River below Sunken Meadow Beach, no. 8049. See p. 382.

Our only station on the Coastal Plain of Virginia.

ALOPECURUS CAROLINIANUS Walt. Ditches, roadsides and old cotton-fields. SOUTHAMPTON COUNTY: Franklin, no. 7758; Haley's Bridge, no. 7759. GREENSVILLE COUNTY: south of Emporia, no. 6949. See p. 372.

MUHLENBERGIA CAPILLARIS (Lam.) Trin. SUSSEX COUNTY: dry hickory and oak woods near Burt, no. 7212.

BRACHYELYTRUM ERECTUM (Schreb.) Beauv. SURRY COUNTY: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8052. See p. 382.

ARISTIDA DICHOTOMA Michx., var. CURTISSII Gray. CAROLINE COUNTY: roadside gravel south of Milford, no. 7214. SUSSEX COUNTY: roadside bordering dry hickory and oak woods near Burt, no. 7216. SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, no. 7215.

A. VIRGATA Trin. Extended inland to DINWIDDIE COUNTY (sphagnous bog about 1 mile northeast of Burgess, no. 7221) and SOUTHAMPTON COUNTY (pine barrens about 7 miles south of Franklin nos. 7218, 7219).

CTENIUM AROMATICUM (Walt.) Hitchc. SUSSEX COUNTY: sphagnous argillaceous boggy depression just northwest of Wakefield, no. 7224 (see p. 367). GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8550.

*DIGITARIA ISCHAEMUM (Schreb.) Muhl., var. MISSISSIPPIENSIS (Gattinger) Fernald. DINWIDDIE COUNTY: wet peaty clearing about 1 mile northeast of Burgess, no. 7229. See p. 369.

Recorded by Hitchcock (Man.) only from Maryland, Tennessee and South Carolina.

*D. SEROTINA (Walt.) Michx. SOUTHAMPTON COUNTY: wet siliceous and argillaceous drained border of Predler's Pond, Nottoway Swamp, southwest of Sedley, no. 7233. See p. 370.

The first from north of North Carolina, except old ballast-land collections from about Philadelphia.

PASPALUM DISSECTUM L. To the solitary station of a single individual previously reported add, also from SOUTHAMPTON COUNTY: wet siliceous and argillaceous drained border of Predler's Pond, Nottoway Swamp, southeast of Sedley, no. 7236; border of peaty pool in cypress-gum swamp, about 4 miles northeast of Capron, no. 7237. See p. 369.

*P. PRAECOX Walt., var. CURTISIANUM (Steud.) Vasey (*P. lentiferum* Lam.). SUSSEX COUNTY: sphagnous siliceous boggy depression just northwest of Wakefield, no. 7241. See p. 367.

The first from north of North Carolina.

*PASPALUM BIFIDUM (Bertol.) Nash, var. **projectum,** var. nov. (TAB. 509), planta 1–1.5 m. alta; culmo superne subnudo; foliis plerumque subbasilaribus, vaginis longe villosis; internodiis superioribus valde exsertis; racemis 2–3, inferioribus divergentibus vel divergenti-adscendentibus valde interruptis, rhachi puberulente; spiculis 3–3.2 mm. longis; gluma inferiora 0.6–1.5 mm. longa vel obsoleta, gluma superiore fructum excedens.—VIRGINIA: dry pine woods east of Burt, Sussex County, September 20, 1937, *Fernald & Long*, no. 7239 (TYPE in Gray Herb., isotypes in Herb. Phil. Acad. and elsewhere). See p. 372.

The remarkable *Paspalum bifidum*, forming a transition between true *Paspalum* and *Panicum*, with its spikelets plump and several-ribbed and with some of the 1st glumes well developed as in *Panicum* but with the spikelets paired on the rachis and some of them without 1st glumes as in *Paspalum*, is, as expressed by Mrs. Chase, "nowhere common, on the Coastal Plain from [southern] South Carolina to Texas" (Chase, N. A. Sp. Pasp. 234). It is clearly an ancient type, now persisting as a relic. The plant of southeastern Virginia, isolated by 325 miles from the northeastern area of true *P. bifidum*, has all the anomalous characters of that species but departs in some points from all the more southern specimens (14 nos.) before me.

Typical *P. bifidum* may have the sheaths villous or rarely glabrous but in only one specimen (*Buckley* from Alabama) is the pubescence so extremely developed as in the Virginia plant. In true *P. bifidum* the upper node is strongly overtopped by the subtending leaf; in var. *projectum* it is 5–16 cm. above the tip of its subtending leaf. In true *P. bifidum* the uppermost blade is 2.5–18 cm. long, with the lowermost raceme borne from below it to only 2 (rarely 3) dm. above it; in var. *projectum* the uppermost blade is only 1–3 (rarely –7) cm. long, with the lowermost raceme 2.5–4.5 dm. above it. In true *P. bifidum* the 2–6 racemes are strongly ascending, often even appressed-suberect, and but slightly interrupted. In var. *projectum* the 2 or 3 racemes are much more interrupted and the lower divergently ascending or even strongly divergent, though in age quite as appressed as in the southern plant. In true *P. bifidum* the rachis of the raceme has scabrous angles, in var. *projectum* it is more universally puberu-

lent. The spikelet of *P. bifidum* is 3.3– barely 4 mm. long, that of the variety 4–4.2 mm. long. In *P. bifidum* the 1st glume, when developed, is broadly deltoid to rounded and only 0.3–0.6 mm. long; in the variety it is narrower and more elongate, 0.6–1.5 mm. long. In *P. bifidum* the fruit projects beyond the 2nd glume; in the variety it is covered.

Such a series of differences might seem to indicate specific separation but, although the aggregate of differential characters is striking, their stability is less so. It seems to me better to consider the plant of Virginia a geographic variety.

*PANICUM CHRYSOPSIDIFOLIUM Nash. SOUTHAMPTON COUNTY: border of sandy woods, Hart's Bridge, no. 8080, very large (up to 8 dm. high) with larger panicles 9 cm. long; dry sandy open pine and oak woods, 6 to 7 miles south of Franklin, no. 8069, small plants (1.7–3 dm. high) with panicles only 2–3 cm. long. See p 378.

Not recorded by Hitchcock (Man.) from north of Florida but collected by Wiegand & Manning in North Carolina in June and July, 1927 (sandy roadside near swale, west of Wilmington, no. 216; sandy roadside bank, 8 miles south of Williamstown, Martin County, no. 215).

P. SPRETUM Schultes. YORK COUNTY: borders of small pond-holes in woods, northeast of Grafton, no. 7255. SURRY COUNTY: peaty depression in woods, east of Eastover, no. 8568. GREENSVILLE COUNTY: wet cut-over sphagnous pine and oak woods near mouth of Three Creek, north of Emporia, no. 8073; *Cephalanthus* swamp about 1 mile north of Skipper's, no. 8569. See p. 371.

The York County station important, since the species was not seen by Grimes.

P. WRIGHTIANUM Scribn. SOUTHAMPTON COUNTY: old cart-road in swampy woods and clearings southeast of Ivor, no. 7257; border of peaty pool in cypress-gum swamp, about 4 miles northeast of Capron, no. 7258.

P. COMMONSIANUM Ashe. SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, abundant and variable, nos. 7264–7268.

P. MUTABILE Scribn. & Smith. Additional station in SOUTHAMPTON COUNTY: moist peaty and sandy depressions in pine barrens, about 7 miles south of Franklin, no. 7277.

P. AMARUM Ell. A species of coastal sands extending up the James to SURRY COUNTY: sandy beach of James River, Claremont Wharf, nos. 8057, 8948.

P. AGROSTOIDES Spreng. The typical form (see RHODORA, XXXVIII.

390) from Southampton County: wet siliceous and argillaceous drained border of Predler's Pond, Nottoway Swamp, southwest of Sedley, no. 7284. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7285. See pp. 369, 371.

P. agrostoides, var. condensum (Nash) Fernald. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7286.

P. rhizomatum Hitchc. & Chase. (*P. anceps* var. Fernald). Inland, locally, to Southampton County (moist peaty and sandy depressions in pine barrens, about 7 miles south of Franklin, no. 7291) and Sussex County (swampy woods southeast of Waverly, no. 7292).

P. hians Ell. Add to stations in Southampton County: alluvial woods, bottomland of Meherrin River, near Haley's Bridge, no. 8054. Greensville County: clay-bottomed shallow pool near Fontaine Creek, west of Dahlia, no. 8578.

P. hemitomon Schultes. To the station reported in Sussex County add one in Isle of Wight County: sandy and peaty border of Cat Pond, south of Benns Church, nos. 7293, 8056. See p. 371.

Sacciolepis striata (L.) Nash. Inland to Dinwiddie County: argillaceous border of millpond, Burgess, no. 7294.

Setaria magna Griseb. York County: along ditch, border of saltmarsh northwest of Yorktown, no. 7296. See p. 372.

Not recorded by Grimes.

*Cenchrus incertus M. A. Curtis. Nansemond County: sandy field by Nansemond River, Suffolk, no. 7298. Isle of Wight County: dry sandy roadside at crossing of Southern Railroad, Lee's Mill, no. 6505. Southampton County: "soft shoulder" of road bordering bottomland of Blackwater River, southeast of Ivor, no. 6025.

An unfortunate extension northward into Virginia.

*Erianthus strictus Baldw. Sussex County: depression in pinelands just southeast of Waverly, no. 7299; exsiccated argillaceous pineland about 2 miles east of Stony Creek, no. 8918. Southampton County: clearing at border of sandy woods, Terrapin Ridge, east of Drewryville, no. 8917. Prince George County: swampy clearing just southeast of Disputanta, no. 8581. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7300. See p. 371.

Extension north from North Carolina.

E. compactus Nash. Sussex County: sphagnous argillaceous boggy depression just northwest of Wakefield, no. 7303. See p. 367.

Seems abundantly distinct from the common *E. giganteus*. We have seen it nowhere else in Virginia.

*E. brevibarbis Michx. Sussex County: peaty swale (cut-over cypress swamp), about 4 miles northwest of Homeville, no. 7301.

Apparently true *E. brevibarbis* is a very rare plant.

SORGHASTRUM ELLIOTTII (Mohr) Nash. Inland to SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, no. 7312; and SUSSEX COUNTY: dry hickory and oak woods near Burt, no. 7314; north to YORK COUNTY: dry open woods northwest of Tabb's, no. 7313.

CYPERUS GLOBULOSUS Aubl. SOUTHAMPTON COUNTY: grassy roadside about 7 miles south of Franklin, no. 7324.

ELEOCHARIS ENGELMANNI Steud. YORK COUNTY: swale southeast of Tabb's, no. 8586. SURRY COUNTY: low wood-road north of Savedge, no. 8101; wet clearing west of Claremont, no. 8975. GREENSVILLE COUNTY: clay-bottomed pool by Fontaine Creek, west of Dahlia, no. 8585.

*E. MELANOCARPA Torr. ISLE OF WIGHT COUNTY: sandy and peaty border of Cat Pond, south of Benns Church, nos. 7338, 8104, 8589. See p. 371.

First station between Georgia and New Jersey. See p. 371.

*E. TRICOSTATA Torr. ISLE OF WIGHT COUNTY: sandy and peaty border of Cat Pond, south of Benns Church, nos. 7339, 8100 and 8102. GLOUCESTER COUNTY: sphagnum-carpeted pool in woods, south of White Marsh, no. 8590. See p. 371.

Not seen by Svenson (see p. 371) from between Georgia and New Jersey; but recorded by Weatherby and Griscom from eastern South Carolina (see RHODORA, XXXVI. 38).

*E. CAPITATA (L.) R. Br., var. VERRUCOSA Svenson in RHODORA, XXXIV. 202 (1932). DINWIDDIE COUNTY: wet argillaceous depressions south of Petersburg, no. 8103. See p. 378.

Very notable occurrence. Svenson cites the variety as occurring from southern Indiana and Illinois to Arkansas and Oklahoma. A recent collection shows it to reach Louisiana.

*BULBOSTYLIS **ciliatifolius** (Ell.), comb. nov. *Scirpus ciliatifolius* Ell. Sk. i. 82 (1816). *Isolepis ciliatifolius* (Ell.) Torr. in Ann. Lyc. N. Y. iii. 352 (1836). *Stenophyllus ciliatifolius* (Ell.) Mohr in Bull. Torr. Bot. Cl. XXIV. 22 (1897). SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, no. 7340; dry sandy old clearing, north of Smith's Ferry on the Nottoway River, no. 8591. See p. 366.

The conservation of *Bulbostylis* Kunth ? (1837) over *Stenophyllus* Raf. (1825) makes necessary this and other transfers.[1] *B. ciliatifolius* has not previously been known north of North Carolina.

[1] BULBOSTYLIS **stenophyllus** (Ell.), comb. nov. *Scirpus stenophyllus* Ell. Sk. Bot. S. C. and Ga. i. 83 (1816). *Dichroma caespitosa* Muhl. Gram. 14 (1817). *Stenophyllus caespitosus* (Muhl.) Raf. Neog. 4 (1825). *Isolepis stenophylla* (Ell.) Torr. in Ann.

As stated, *Bulbostylis* of somebody has been conserved in the International Rules of Botanical Nomenclature, as readjusted at Cambridge and thereafter (ed. 3: 132, no. 471 partim).

*Bulbostylis Kunth. Enum. Pl. II. (1837) 205. [Nom. conserv.]	Stenophyllus Raf. Neogen. (1825) 4. [Nom. rejic.]

The conservation is effected through the use of the asterisk, which is said to mean that a majority of the Committee appointed at Cambridge, of whom the present writer was (in this instance) in the minority, had voted for it. Now the least bit of bibliographic investigation will show that Kunth DID NOT properly publish *Bulbostylis* as a genus which he himself accepted. In his treatment of the genus *Isolepis*, he split that genus into four main divisions: "1) Species legitimae" (p. 187); "2) Species parum anomalae" (p. 202); "3) Species alienae, genus proprium (BULBOSTYLEM) inter Isolepidem et Fimbristylem constituentes. Stylus tri-, rarissime bifidus, basi bulboso-incrassatis. Achenium basi styli persistente tuberculatum" (p. 205); and (p. 214) "Species a me haud visae, affinitate dubiae." The species under divisions 1 and 2 number 56, all called *Isolepis*. After the definition of division 3, the numbering of species goes straight on, from 57 to 82, and every specific name is preceded by the initial I (for *Isolepis*), like all which precede it. Although Kunth made the gesture of suggesting *Bulbostylis* (name already twice used in two separate families) as a genus, he did not have sufficient conviction to call the species under it by that name but left them unequivocally as *Isolepis*. Furthermore, even those who maintain that *Bulbostylis* Kunth (1837) is a properly published genus must admit that it was antedated by the really unequivocal *Stenophyllus* Rafinesque (1825). By Art. 60 of the International Rules *Bulbostylis* Kunth was illegitimate (it was also illegitimate under Art. 61, because it is a *later homonym* on two counts). Art. 60, in part, reads "A name is illegitimate in the following cases. (1) If it was superfluous when published, i.e. if there was a valid name

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Lyc. N. Y. iii. 353 (1836). *Stenophyllus stenophyllus* Britton in Bull. Torr. Bot. Cl. xxi. 30 (1894).

B. **coarctatus** (Ell.), comb. nov. *Scirpus coarctatus* Ell. Sk. Bot. S. C. and Ga. i. 83 (1816). *Isolepis coarctata* (Ell.) Torr. in Ann. Lyc. N. Y. iii. 353 (1836). *Stenophyllus coarctatus* (Ell.) Britton in Small, Fl. Se. U. S. 189, 1327 (1903).

B. **floridanus** (Britton), comb. nov. *Stenophyllus floridanus* Britton in Nash in Bull. Torr. Bot. Cl. xxii. 161 (1895).

B. **antillanus** (Britton), comb. nov. *Stenophyllus antillanus* Britton in Bull. Torr. Bot. Cl. xliii. 447 (1916).

B. **portoricensis** (Britton), comb. nov. *Stenophyllus portoricensis* Britton in Torreya, xiii. 216 (1913).

B. **nesioticus** (I. M. Johnston), comb. nov. *Stenophyllus nesioticus* I. M. Johnston in Univ. Calif. Pub. Bot. vii. 438 (1922).

Not to be confused with *Bulbostylis nesiotis* (Hemsl.) C. B. Clarke.

for the group to which its was applied, with its particular circumscription, position and rank." Then follow illustrations. *Stenophyllus* Raf. (1825) consisted of the one species, *S. caespitosus* Raf., a renaming of *Scirpus stenophyllus* Elliott. Division 3 of Kunth's treatment of *Isolepis* (his *Bulbostylis*) also included *I. stenophylla*, based upon *Scirpus stenophyllus*. Kunth's name was, therefore, doubly (or trebly) illegitimate.

The situation is closely parallel to that of *Atropis* and *Puccinellia*, except that *Atropis* was neither a later homonym nor illegitimate for the reason that it contained a group already legitimately named.[1] Ruprecht, under *Poa*, had sectional or subgeneric names: "Poa (Phippsia) algida (R. Br.)," "Poa (Catabrosa) airoides Koel.", "Poa (Atropis) distans L.," etc.; and at the end of the treatment he said "Atropis Trin. (P. distans) Catabrosae quoad glumas proxima, spiculas habet (saltem in statu virgineo) lineares, fere teretes; in Arctophila nostra semper ex ovato-oblongae vel lanceolatae. E conditione glumarum generum series fortasse sequens: Dupontia, Arctophila, Poa, Atropis," etc. *Atropis*, AS A GENUS, was not properly published until taken up and actually used as a genus by Grisebach in 1853. In 1848 *Puccinellia* Parl. was legitimately published as a genus, including *P. distans*, which had been the basis of Ruprecht's provisional genus *Atropis*. Therefore, in the same list which conserves "Bulbostylis Kunth, Enum. Pl. II. (1837) 205," *Atropis* (a parallel case and definitely called a "nomen provisorium" which is illegitimate) is properly rejected and *Puccinellia* properly conserved. As a genus, unequivocally so treated, *Bulbostylis* was apparently first taken up by C. B. Clarke (in Hook. f. Fl. Brit. Ind.) in 1893. In the meantime *Stenophyllus* Raf., properly published in 1825, had been revived and correctly used by Britton in 1891. By a singular reversal of logic, in the list which properly conserves *Puccinellia* over *Atropis*, the name of the doubtfully published genus, *Bulbostylis*, dated incorrectly from Kunth's questionable publication in 1837, instead of from Clarke's (or some other) definite one, is conserved, in spite of its treble illegitimacy, over the adequately published and wholly legitimate *Stenophyllus* Raf. (1825). This, of course, was done because the name *Bulbostylis* had been more generally used than had *Stenophyllus*, a perfectly valid reason; the trouble is the bibliographic

[1] For discussions of the situation see Fernald & Weatherby in RHODORA, xviii. 1, 2 (1916) and Fernald, ibid, xxviii. 150, 151 (1926).

one. Since it is requisite to good sportsmanship as well as statesmanship for the minority to accept the decision of the majority, I take up *Bulbostylis*, although I am still undecided about its authorship (perhaps those who urged its conservation can clarify that point). In taking up *Bulbostylis* I endeavor not to tuck the tip of my tongue into my cheek nor smilingly to remember the "Guiding Principle" of botanical nomenclature (Chap. I, Art. 3): "The rules of nomenclature should be simple and founded on considerations sufficiently clear and forcible for everyone to comprehend and be disposed to accept." The original Article 3 stated also that they "should neither be arbitrary nor imposed by authority." In some way this clause got lost in the rewriting.

The Varieties of Bulbostylis capillaris (Plate 510). The commonest and most wide-spread species in eastern North America is *Bulbostylis capillaris*, based upon *Scirpus capillaris* L. Sp. Pl. i. 49 (1753). This much is clear; otherwise the history of the name and the taxonomic and geographic limits of *B. capillaris* are perplexingly vague. The name is used in most parts of the warm regions of the world for something; until the whole group is intelligently and cautiously studied the specific limits can hardly be stated. The present study is restricted to the variable plant of temperate eastern North America.

Scirpus capillaris L. was itself a confused concept. It was published with an original diagnosis, based upon a specimen in Linnaeus's own herbarium, and quotations from his Hortus Cliffortianus and Flora Zeylanica, as well as others from Plukenet and Burman, with "*Habitat in* Virginia, Aethiopia, Zeylona," a sufficiently cosmopolitan range. I am quite unfitted to place all the elements myself. The plant of Ceylon, as shown by Burman's figure, cited by Linnaeus, has nothing to do with the plants of Virginia and of Ethiopia; it is, according to Sir Joseph Hooker in Trim. Fl. Ceylon, v. 66 (1900) *B. barbata* (R. Br.) C. B. Clarke (wrongly ascribed to Kunth). The Ethiopian plant, *Gramen junceum perpusillum; capillaceis foliis, aethiopicum* of Plunkenet, as shown by his plate, is certainly not a *Bulbostylis*. Without fuller knowledge of the plant actually before Linnaeus when he published his Hortus Cliffortianus it is not possible to say just what Linnaeus then had, but his plant (or plants) came from Jamaica and he cited the Ethiopian plant of Plukenet and a plate of Sloane's which represents some species of *Bulbostylis* but

not the plant of Virginia. The latter, which alone was in the Linnean herbarium when Species Plantarum was being prepared, is a well-preserved specimen and must stand as the TYPE of *Scirpus capillaris*. The photograph of it, most generously supplied me by Mr. Savage, shows it to be the extreme of our North American species which I described as *Stenophyllus capillaris* var. *cryptostachys* Fernald in RHODORA, xix. 154 (1917). Two other varieties of the species occur in the eastern United States. It is presumable that in the specific synonomy names for them might be found; as varieties they do not require names which were given as binomials and, in view of the very confused condition of the genus, it is wiser to assign unequivocal names and types to all three. As I see *Bulbostylis capillaris* it consists of

BULBOSTYLIS CAPILLARIS (L.) C. B. Clarke[1] in Hook. f. Fl. Brit. Ind. vi. 652 (1893), as to type only, the name erroneously ascribed to Kunth. *Scirpus capillaris* L. Sp. Pl. i. 49 (1753), as to new diagnosis and type-specimen in Herb. Linn. (our FIG. 1). *Isolepis capillaris* (L.) R. & S., Syst. ii. 118 (1817). *Fimbristylis capillaris* (L.) Gray, Man. 530 (1848). *Stenophyllus capillaris* (L.) Britton in Bull. Torr. Bot. Cl. xxi. 30 (1894). *S. capillaris*, var. *cryptostachys* Fernald in RHODORA xix. 154 (1917).—Plant bearing crowded sessile spikelets at the bases of the leaves; spikelets of the terminal umbel rather crowded, 3–10 mm. long, longer than their pedicels.—Southern Maine to Minnesota, south to Virginia and Missouri. FIG. 1, TYPE of *B. capillaris*, × 1; FIG. 2, base from TYPE of var. *cryptostachys*, × 2; FIG. 3, inflorescences of the latter, × 1.

Var. **crebra,** var. NOV. (TAB. 510, FIG. 4 et 5), spiculis basilaribus sessilibus nullis; umbellae spiculis lateralibus 2.5–6 mm. longis breviter pedicellatis, pedicellis inaequalibus 0.1–1 cm. longis.—Maine to Nebraska, south to Georgia, Tennessee, Oklahoma and Texas. TYPE: Muddy Pond, Stony Brook Reservation, MASSACHUSETTS, August 22, 1912, *G. G. Kennedy* (Herb. Gray). FIG. 4, portion of TYPE, × 1; FIG. 5, portion of base × 2.

*Var. **isopoda, var. nov.** (TAB. 510, FIG. 6), spiculis basilaribus sessilibus nullis; umbellae spiculis subaequaliter pedicellatis 2.5–9 mm. longis, pedicellis plerumque 0.6–3 cm. longis.—Maryland to southern Illinois, south to Georgia, Alabama, Arkansas and Texas.

[1] Index Kewensis assigns the specific combination to Nees in Mart. Fl. Bras. ii[1], 84, in obs. Reference to the treatment of Nees (1842) shows that, describing a new species under the generic name *Oncostylis* he compared it with "*Bulbostylis capillaris*" (name undefined and its source not given). Nees was using the generic name *Oncostylis* and he loosely cited herbarium-names ("*Bulbostylis paradoxa N. ab E. in Herb. Caes. Vindob. n. 89*," "*Bulbostylis tenuifolius N. ab E. in Herb. Caes. Vindob.*", etc.) as synonyms. Such names, of course, have no status in nomenclature. Nees was not taking up *Bulbostylis* as a genus; he gave the case away (p. 85) by correctly citing "*Isolepis* (*Bulbostylis*) *Langsdorffii Kunth. En. II. 214.*"

Type: wet sand of dune-hollows, south of False Cape, Princess Anne County, Virginia, *Fernald & Long*, no. 3737 (in Herb. Gray). Fig. 6, inflorescences of the type, × 1.

*Scirpus fontinalis Harper. Surry County: calcareous meadow near head of Sunken Meadow Creek, south of Claremont, no. 7761; abundant along rills in rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8108. Beginning to flower in early April; fruit dropping in early June. See pp. 376, 381, 382.

A remarkable range-extension but one of a type now becoming familiar. The very distinct and almost showy *Scirpus fontinalis* was discovered by Harper about a reputedly calcareous spring-fed shaded pool in Sumter County, Georgia. It has apparently not been known outside of Georgia. The Virginia area is in the calcareous fossil belt of Surry County, an extensive colony, the plant abundant all along the woodland rills and persisting by their margins on the cleared meadows.

*Scirpus atrovirens Muhl., var. **flaccidifolius,** var. nov., planta flaccida reclinata vel valde arcuata; rhizomate elongato; culmo solitario arcuato vel reclinato; foliis submembranaceis flaccidis translucentibus basi membranaceis planis; paniculis umbelliformibus laxis; spiculis ovoideis 3–4 mm. longis; perianthii setis achaeniis subaequantibus.—Southampton County, Virginia: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, June 16, 1938, *Fernald & Long*, no. 8109 (type in Herb. Gray; isotype in Herb. Phil. Acad.). See p. 376.

Scirpus atrovirens, in its typical form, and var. *georgianus* (Harper) Fernald (*S. georgianus* Harper) both grow as erect stools with usually several stiff culms. Typical *S. atrovirens* has the leaves firm and opaque, the sheaths of the lower superficially nodulose-septate, the ovoid to cylindric spikelets 3.5–8 mm. long, the achenes overtopped by the perianth. In var. *georgianus* the firm and opaque leaves have smooth (not superficially nodulose) sheaths, the spikelets are 2–4 mm. long and the perianth is wanting or very short. Var. *flaccidifolius* differs from them both in its non-cespitose habit, weak culm, and membranous and translucent leaves. It has the lower sheaths smooth, as in var. *georgianus*, the spikelets broader than in most material of either that or typical *S. atrovirens*, and the long perianth of the latter.

The Type of Fuirena squarrosa.—Two species of *Fuirena* occur in the northeastern United States—from Virginia northward. They are readily separated as follows:

No. 1. Annual, tufted, with culms 0.5–4.5 dm. high, often depressed; olivaceous scales of spikelets delicately nerved, with strongly curving awns; perianth-scales narrowly to broadly oblong or ovate, attenuate to a long retrorsely barbed awn; barbed bristles usually exceeding the yellow-brown achene, which is equaled by the persistent style. *F. pumila* Torr.; *F. squarrosa* of recent American authors.—Bogs and wet peaty or sandy shores, Florida to Massachusetts; southern Michigan and northwestern Indiana.

No. 2. Perennial, with thick rhizome; culms 0.25–1 m. high, erect; scales of spikelet with coarsely corrugated center and straight or but slightly curving awns; perianth-scales rhombic or deltoid-ovate, blunt or with a short thick smooth terminal subulus, the interposed mostly barbless bristles shorter than the yellow achene, which is twice as long as the persistent style. *F. hispida* Ell.—Wet sandy places, Florida to Texas, north to New Jersey, Kentucky and Oklahoma; also West Indies.

By the earlier American botanists the two were not generally specifically separated or were considered varieties of one specific type which, naturally, took the earliest name, *F. squarrosa* Michx. Fl. Bor.-Am. i. 37 (1803); but they are now generally recognized as quite definite species. Unfortunately, when, in recent years, the two were set apart as species insufficient care was taken in determining to which Michaux's name applied. In his *Revision of the United States Species of the Genus Fuirena,* Bull. Torr. Bot. Cl. xvii. 1–8 (1890), Coville was misled by assuming that Michaux's type is at Kew, rather than in Paris. Coville said:

"By the kindness of Mr. C. B. Clarke of the Royal Herbarium at Kew, I have been able to ascertain that this [our no. 1] is the typical form of Michaux's *F. squarrosa.* He writes 'Our original specimen of Michaux named *squarrosa* is the slender plant 6 to 8 inches high with fibrous roots, in short = *simplex* Vahl. var. *pumila* sp. Spreng.' " (Coville, p. 6).

Unhappily, however, the types of Michaux's *Flora Boreali-Americana* can hardly be assumed to be at Kew. They are generally known to be in Paris. Michaux's plant from Georgia and Carolina had the technical characters of our no. 2 and was so described by him: "paleis pistillinis petiolata-spathulatis, muticis; interjectis totidem setulis brevibus," characters which keep it out of our no. 1. Incidentally Coville, citing the specimens examined by him, enumerated none of our no. 1, which he took for true *F. squarrosa,* from Georgia and South Carolina, but our no. 2, *F. hispida* Ell., with the technical characters of Michaux's diagnosis of *F. squarrosa,* was cited from both Georgia and South Carolina. Fortunately, the beautiful photograph of the material in the Michaux Herbarium at the Muséum National d'Histoire Naturelle, kindly sent to me by Professor Humbert and M.

Metman, beautifully displays our no. 2, so that there is no reason longer to perpetuate the error which arose when Clarke inferred that a specimen at Kew is typical. *F. hispida* Ell. (1821) must go into the synonymy of F. SQUARROSA Michx. (1803).

The smaller annual species (our no. 1), which has erroneously passed as *F. squarrosa* is F. PUMILA Torr. ex Spreng. Syst. i. 237 (1825). Torrey in 1826, without referring to Sprengel's publication of his *F. pumila*, treated *F. squarrosa* as the tall plant of the South, the smaller being called by him *F. squarrosa*, β *pumila*, Compend. Fl. N. Mid. St. 46 (1826).

As to the name "*simplex* Vahl. var. *pumila* sp. Spreng.," apparently coined by Clarke in the hope of clarifying the situation, it is apparently a new combination, but made without proper bibliographic citations.

RHYNCHOSPORA WRIGHTIANA Boeckel. DINWIDDIE COUNTY: wet peaty clearing about 1 mile northeast of Burgess, no. 7355. SOUTHAMPTON COUNTY: peaty and argillaceous clearing in pineland east of Courtland, no. 8119. PRINCE GEORGE COUNTY: wet pineland south of Petersburg, no. 8602. ISLE OF WIGHT COUNTY: sphagnous border of Cat Pond, south of Benns Church, no. 8118.

R. CYMOSA Ell., var. GLOBULARIS Chapm. Frequent inland to DINWIDDIE and GREENSVILLE COUNTIES.

R. HARVEYI W. Boott. DINWIDDIE COUNTY: sphagnous border of spring-fed pond at Century House, northeast of Burgess, no. 8116; pineland at west side of Wilcox Lake, Petersburg, no. 8596. SUSSEX COUNTY: peaty swale and open wooded swamp 3½ to 4 miles northeast of Homeville, no. 8111; peaty and argillaceous swale north of Littleton, nos. 8112, 8113.

Readily distinguished from the common *R. cymosa* by the acute flange at the base of the tubercle. In habit similar to, but the inflorescence more flexuous and without the prominent, stiff involucre of, *R. cymosa*. Presumably overlooked because of its early maturing. The single small collection made in Prince George County in 1936 was in mature fruit on June 19, and later in the summer we did not find it. Our collections of 1938 were fully mature as early as June 8.

R. FASCICULARIS (Michx.) Vahl. GREENSVILLE COUNTY; depressions in dry open sandy pine and oak thickets near the Sussex County line, north of Emporia, no. 8114.

Previous Virginian records only from Princess Anne County.

*R. PERPLEXA Britton. DINWIDDIE COUNTY: wet argillaceous depression south of Petersburg, no. 8603. SUSSEX COUNTY: wet

peaty depression in pineland 3 to 4 miles northwest of Waverly, no. 8115. See p. 381.

First from north of North Carolina. The Waverly station, a small depression, on June 12, 1938, full of water, is one with many localized species. *Rhynchospora perplexa*, fully mature and with ripe achenes dropping on that date, superficially resembles *R. Torreyana*, with which it grows and which was hardly in anthesis. Its inflorescence is fuller and darker, the small castaneous spikelets sessile or subsessile in small fascicles and the achenes smaller and broader. It has presumably been overlooked because of its early maturing.

SCLERIA OLIGANTHA Michx. SUSSEX COUNTY: border of wooded bottomland of Nottoway River, east of Stony Creek, no. 8123. GREENSVILLE COUNTY: rich deciduous woods by Metcalf Branch, east of Emporia, no. 8124; and noted at other stations. Presumably overlooked because of its early maturing.

CAREX VULPINOIDEA Michx.

The plants on the wooded bottomland of the Meherrin River, near Haley's Bridge, are of a dark blue-green color, rather than the usual yellow-green; but they seem to show no morphological differences. See p. 376.

C. BROMOIDES Schkuhr. SURRY COUNTY: by brook in drained cypress swamp, Claremont Wharf, nos. 7762, 7763. See p. 382.

Not seen elsewhere by us on the Coastal Plain. No. 7763, growing in loose litter, shows the rhizome somewhat elongate, an unusual tendency in the species.

*C. PENSYLVANICA Lam. ISLE OF WIGHT COUNTY: sandy pine barrens, south of Zuni, no. 7773. See p. 374.

Not seen by Mackenzie (N. Am. Fl.) from the state.

*C. UMBELLATA Schkuhr (*C. abdita* Bickn.). BRUNSWICK COUNTY: rich wooded slope by Meherrin River, 8 miles southeast of Cochran, no. 6953. SUSSEX COUNTY: rich wooded slope, 4 miles south of Stony Creek, no. 6952. ISLE OF WIGHT COUNTY: dry sandy yellow pine and oak woods near Walters, no. 7775. See p. 374.

Not seen by Mackenzie (N. Am. Fl.) from south of the District of Columbia.

*C. TONSA (Fern.) Bicknell. ISLE OF WIGHT COUNTY: sandy pine barrens, south of Zuni, no. 7774. SOUTHAMPTON COUNTY: open sandy woods and thickets, Cypress Bridge, no. 6951. See p. 374.

Not seen by Mackenzie (N. Am. Fl.) from south of the District of Columbia.

*Carex digitalis Willd., var. **macropoda,** var. nov. (tab. 511, fig. 3 et 4), planta dense cespitosa, culmis foliisque suberectis 3–6 dm. altis; spicis masculis longe pedunculatis pedunculis plerumque 0.5–2 dm. longis; spicis foemineis longe pedunculatis pedunculis imis 4–10 cm. longis.—Maryland and southern Indiana, south to North Carolina and Louisiana. Maryland: damp rocky woods along the Potomac, southeast of Great Falls, June 11, 1904, *Agnes Chase*, no. 2301. Virginia: Richmond, May 9, 1894, *J. R. Churchill;* rich woods, Great Neck, Princess Anne County, May 5, 1935, *Fernald & Griscom*, no. 4332, noted as having "exceptionally long staminate peduncles"; dry rich woods near Metcalf Branch, east of Emporia, April 8, 1938, *Fernald & Long*, no. 7767 (type in Gray Herb., isotype in Herb. Phil. Acad.); dry wooded slopes by Three Creek, Drewryville, April 9, 1938, *Fernald & Long*, no. 7768; rich wooded slope near Applewhite Church, Southampton County, April 9, 1938, *Fernald & Long*, no. 7769; rich deciduous woods northeast of Statesville, Southampton County, June 16, 1938, *Fernald & Long*, no. 8147; rich wooded slope, South Quay, Nansemond County, June 19, 1938, *Fernald & Long*, no. 8148. North Carolina: Wilmington, *M. A. Curtis.* Indiana: wooded slope about 5 miles southeast of English, Crawford County, June 9, 1919, *Deam*, no. 27,837; wooded slope of the Van Buren Ridge, about 8 miles southeast of Cannelton, Perry County, April 24, 1919, *Deam*, no. 27,119. Louisiana: dry woods, April, ——, Red River, *Hale.*

Var. *macropoda*, noted by Griscom and me (see p. 374), when we first found it in 1935, on account of its very long staminate peduncles, is the only variation of *Carex digitalis* known to us from the Coastal Plain of Virginia, although it doubtless overlaps into the Piedmont area of the state. Its occurrence at Wilmington, North Carolina, in Louisiana and in the lower Ohio drainage in southern Indiana suggests that it is an austro-riparian extreme, which will be found in other southeastern states. Typical wide-spread *C. digitalis* (figs. 1 and 2) is usually low, with loosely spreading or arching culms (0.5–5 dm. high), the staminate spike approximate to the upper pistillate spike or to the uppermost bract or on a peduncle rising 0.2–3(–4.5) cm. above the bract or pistillate spike, the inflorescence frequently overtopped by the leafy median bract. Its pistillate spikes are short- to long-stalked, the uppermost even subsessile, but the lower peduncles are rarely so long as in var. *macropoda.* Var. *macropoda* is at once distinguished by its strongly erect habit, the heavy almost coralline-branched cespitose base, the long peduncles and the relatively short bracts, the staminate spikes rising high beyond them.

The name *Carex digitalis*, forma *podostachys* (Steud.) Kükenthal in

Engler, Pflanzenr. iv[20]. 528 (1909), based on *C. podostachys* Steud. Syn. Cyp. 232 (1855), suggests that Steudel might have had var. *macropoda* before him from New Orleans. I have not seen Steudel's type but his plant was only 4–7 inches high, with "spica suprema mascula tenui solitaria plerumque foemineae primae approximata," suggesting ordinary *C. digitalis;* but the "foliis . . . lanceolatis" and spicis "foemineis . . . ex axillis infimis foliorum in pedunculo capillari filiformi culmum plus minusve aequante . . . pauci (sub-5-)floris," as well as the "utriculis . . . obtusiusculis" suggest that *C. podostachys* may not belong with *C. digitalis.* At least it is not *C. digitalis,* var. *macropoda.*

C. FLACCOSPERMA Dewey. To the record already published, from Norfolk County, add the following. SUSSEX COUNTY: border of wooded bottomland of Nottoway River, east of Stony Creek, no. 8156. SOUTHAMPTON COUNTY: wooded bottomland of Meherrin River, near Haley's Bridge, no 7772. GREENSVILLE COUNTY: rich deciduous woods by Metcalf Branch, east of Emporia, nos. 8157 (blue-green), 8158 (yellow-green). See p. 380.

C. CAROLINIANA Schwein. SOUTHAMPTON COUNTY: alluvial woods, bottomland of Meherrin River, Haley's Bridge, no. 8160, culms up to 1.65 m. high! See p. 377.

Our only station; the related *Carex complanata* Torr. & Hook. generally common.

C. BARRATTII Schwein. & Torr. To the only recorded Virginian station (near Waverly) add from SUSSEX COUNTY: open savannah-like swales in woods east of Stony Creek, no. 8140. GREENSVILLE COUNTY: wet cut-over sphagnous pine and oak woods, near Three Creek, north of Emporia, no. 8141.

Dominant, with *C. bullata, C. Buxbaumii* (new to Virginia), *Panicum scabriusculum* and *P. consanguineum* and other local species, over scores of acres of swale east of Stony Creek, probably one of its most extensive single areas of occurrence. See p. 381.

*C. BUXBAUMII Wahlenb. SUSSEX COUNTY; open savannah-like swales in woods east of Stony Creek, no. 8144, one of the largest extremes of the species. See note under *C. Barrattii.* See p. 381.

Not seen by Mackenzie (N. Am. Fl.) from the state.

C. STRICTA Lam. To the first Virginian station (in Princess Anne County), already reported, add one from PRINCE GEORGE COUNTY: swampy woods, bottomland of Powell's Creek, Garysville, no. 8142.

C. COLLINSII Nutt. To the first Virginian station (in Sussex County), already reported, add one from GREENSVILLE COUNTY: sphagnous wooded spring-heads east of Emporia, no. 8172. HENRICO

County: boggy thicket bordering Whiteoak Swamp, west of Elko Station, no. 9005. See p. 380.

C. Frankii Kunth. To the stations already reported (from Henrico and Sussex Counties) add the following. Prince George County: swampy woods, bottomland of Powell's Creek, Garysville, no. 8164. Surry County: swampy calcareous wooded gullies by James River, Claremont Wharf, no. 8165; seen in similar habitat at Eastover. Gloucester County: moist sandy border of pine woods, east of Gloucester, no. 8619. See p. 382.

C. squarrosa L. Local range extended southward through Greensville and Southampton Counties.

C. Grayii Carey. Local range extended eastward to Surry County: bottoms of calcareous wooded gullies by James River, Claremont Wharf, no. 8169, and seen in similar habitat at Eastover; and southward to Southampton County: alluvial wooded bottomland of Meherrin River, near Haley's Bridge, no. 8170; both the minor var. hispidula Gray. See p. 382.

C. bullata Schkuhr. To the first Virginian station (in Prince George County), already reported, add the following. Prince George County: inundated swampy thicket north of Templeton, no. 8173, culms up to 1 m. high. Sussex County: open savannah-like swales in woods east of Stony Creek, dominant, no. 8174 (see note under *C. Barrattii*); sphagnous depression, Wakefield, no. 8628. Greensville County: wooded swamp about 1 mile north of Skipper's no. 8629. Henrico County: sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, no. 9003. See p. 381.

Arisaema Dracontium (L.) Schott. Southampton County: alluvial wooded bottomland of Meherrin River, near Haley's Bridge, no. 8167.

Our only station on the Coastal Plain. See p. 377.

Symplocarpus foetidus (L.) Nutt. Surry County: along brook, rich calcareous wooded gullies at head of Sunken Meadow Creek, south of Claremont, local, no. 8179. See p. 382.

Lachnocaulon anceps (Walt.) Morong. To the recorded stations from other counties add one in Sussex County: pocket in pine woods bordering an open wooded swamp, 3½ to 4 miles northeast of Homeville, no. 8181; also one in Greensville County: forming extensive turf in sphagnous bog, about 1 mile northeast of Dahlia, no. 8630.

Xyris torta Sm., var. macropoda Fernald in Rhodora, xxxix. 395 (1937). To the original stations add from Dinwiddie County: sphagnous boggy margin of spring-fed pond, Century House, northeast of Burgess, no. 7371; sphagnous bog about 1 mile northeast of Burgess Station, no. 7372. Greensville County: sphagnous bog about 1 mile northwest of Dahlia, no. 8632. Brunswick County: argillaceous swale about 5 miles east-southeast of Edgerton, no. 8633. See p. 368.

X. AMBIGUA Beyrich. Local range extended westward to DINWIDDIE COUNTY: sphagnous bog about 1 mile north of Burgess, no. 7363; and GREENSVILLE COUNTY: wooded swamp of Mill Creek, north of Skipper's, no. 8634; and southeastward to NANSEMOND COUNTY: roadside ditch near St. Mary's Church, southwest of Whaleyville, no. 7368; roadside ditch bordering oak and pine woods, south of Suffolk, no. 7369.

*TRADESCANTIA ROSEA Vent., var. GRAMINEA (Small) Anders. & Woodson. SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, nos. 7374, 8182; dry sandy old clearing north of Smith's Ferry, no. 8639. See pp. 366, 380.

First from north of North Carolina.

*PONTEDERIA LANCEOLATA Nutt., forma BRASILIENSIS (Solms) Fernald in RHODORA, xxvii. 81 (1925). NANSEMOND COUNTY: margin of Somerton Creek, wooded bottomland, Factory Hill, nos. 8184, 8646. See p. 379.

First from north of Florida.

JUNCUS ELLIOTTII Chapm. Local range extended to SUSSEX COUNTY: open savannah-like swales in woods east of Stony Creek, no. 8187; and GREENSVILLE COUNTY: wet cut-over sphagnous pine and oak woods near Three Creek, north of Emporia, no. 8186; seen at other stations. See p. 381.

Probably overlooked because of its early development.

J. BRACHYCARPUS Engelm. To the single station reported for Virginia add the following. SUSSEX COUNTY: swale south of Stony Creek, no. 8189; peaty swale and open wooded swamp 3½ to 4 miles northeast of Homeville, nos. 8190, 8191. DINWIDDIE COUNTY: wet argillaceous depressions south of Petersburg, no. 8188; low clearing south of McKenney, no. 8651. GREENSVILLE COUNTY: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 8192. GLOUCESTER COUNTY: damp sandy border of woods east of Gloucester, no. 8652. See p. 378.

Apparently frequent or even common throughout the area. Heretofore considered one of the rarest species of the Atlantic States. Maturing very early (June) and over-ripe or shattered before the habitally similar midsummer- and autumn-fruiting *J. scirpoides* is conspicuous. Old and dried inflorescences are, late in the season, doubtless passed as last-year's inflorescences of the latter species.

LUZULA BULBOSA (Wood) Rydb. A most distinct species of woods and clearings in GREENSVILLE, SUSSEX and PRINCE GEORGE COUNTIES (many nos.). See p. 372.

L. ECHINATA (Small) Hermann. Rich woods, general eastward to NANSEMOND COUNTY (many nos.).

L. CAROLINAE Watson, var. **saltuensis** (Fernald), comb. nov. *L. saltuensis* Fernald in RHODORA, v. 195 (1903). *Juncoides pilosum* (L.) Coville, var. *saltuense* (Fernald) Farwell in Mich. Acad. Sci., Rep. xx. 170 (1918).

Luzula saltuensis, as it occurs in eastern Canada and the northern-most states is sufficiently different from the type of *L. carolinae* Watson in Proc. Am. Acad. xiv. 302 (1879). The latter was a single culm with the inflorescence overtopped by an erect frondose bract 1 dm. long. The longer branches of the inflorescence are forking, and the lower leaves are prolonged. The relative length of filament and anther differs in the northern series and the type of *L. carolinae* and it has seemed possible to hold the two series apart. In the Piedmont and Coastal Plain regions of Virginia, however, the plants have the forking rays of the inflorescence of *L. carolinae*, the anther-length proves variable and the bract at base of the inflorescence is, as in *L. saltuensis*, very short. Much study convinces me that the type of *L. carolinae* was an exceptional individual and that the large southern series, with some rays forking and with castaneous sepals, should be placed with it. Very evident transitions occur in western New York, southern Ontario and southern Michigan. This transitional series was named *Juncoides pilosum*, var. *michiganense* Farwell, l. c. (1918).

THE SOUTHERN VARIETY OF SMILACINA RACEMOSA (PLATES 512 and 513).—As it occurs in the northern portion of its range, from Quebec to British Columbia, thence southward to Nova Scotia, New England, most of New York and less characteristically southward, *Smilacina racemosa* (L.) Desf. has an ovoid to pyramidal panicle usually 1–1.5 dm. long and one-half to three-fourths as broad. From southern New England and northern New Jersey southward the species often has a subcylindric panicle usually less than 8 cm. long and only one-fourth to three-eighths as thick. Familiar with the plant of northeastern Canada and northern New England, I have been much impressed by these Virginian specimens in the field but have been unable to win a sympathetic response from my companion, Mr. Long. This apathy on his part was at once explained when I visited him at his home near Philadelphia while *Smilacina racemosa* was abundantly flowering in his woods, for the plant near Philadelphia is like that of most of eastern Virginia in having short and comparatively slender panicles. A comparison of the distinctive northern and the distinctive southern series brings out several strong tendencies which,

taken together, indicate a geographic segregation which should be given recognition. These are summarized below.

Northern Series. Stem up to 1 m. high; larger leaves of mature plants 1–2.5 dm. long, 3.5–9.5 cm. broad; panicle sessile or on a peduncle usually less than ½ its length, ovoid to pyramidal, 0.7–1.7 dm. long, 3–10 cm. in diameter, ⅜–¾ as broad as long, its longer branches 2–6 cm. long and with 8–24 flowers. Plate 512.

Southern Series. Stem rarely 7.5 dm. high; larger leaves of mature plants 0.85–1.7 dm. long, 3.5–6 cm. broad; peduncle ½–5/4 as long as the nearly cylindric panicle; the latter 4.5–8.5 (rarely –13) cm. long, 1.5–3 cm. in diameter, ¼–⅜ as broad as long, its longest branches 1–2.5 cm. long, 6–10-flowered. Plate 513.

Smilacina racemosa rests upon *Convallaria racemosa* L. Sp. Pl. i. 315 (1753), which in turn went back to *Polygonatum racemosum* Cornut (1635). The Linnean treatment was as follows:

5. CONVALLARIA foliis sessilibus, racemo terminali composito. *racemosa.*

Convallaria racemo composito. *Roy. lugdb.* 26.
Convallaria foliis alternis, racemo terminali.
Hort. cliff. 125. *Gron. virg.* 38.
Polygonatum racemosum. *Corn. canad.* 36, *t.* 37.
Polygonatum ramosum & racemosum spicatum. *Moris. hist.* 3. *p.* 537. *s.* 13. *t.* 4. *f.* 9.
Polygonatum racemosum americanum, ellebori albi foliis amplissimis. *Pluk. alm.* 301. *t.* 311. *f.* 2.
Habitat in Virginia, Canada. ♃ [L. Sp. Pl. i. 315, 316 (1753)].

Linnaeus gave a brief original diagnosis. I have not seen the specimen in his herbarium and the series of photographs of Linnean types sent me by Mr. Savage does not contain it. The application of the name, however, is fairly clear, although Linnaeus confused, as have all subsequent botanists, the two varieties. Ultimately *Smilacina racemosa* goes back to *Polygonatum racemosum* Cornut, Canad. Pl. 36 and *P. ramosum* Cornut, l. c. 37 (1635), where the Canadian plant was described under the former and illustrated under the latter name. The illustration, ramose presumably through the intervention of the artist, shows apparently the common northern plant unnaturally forking at the middle, one leafy branch terminated by an ovoid panicle in flower the other by a similar panicle in fruit. Although highly conventionalised and presumably unnatural, the plate shows relatively short peduncles and is better for the northern than for the southern series of specimens. Chronologically the next reference given by Linnaeus was to Morison's Plantarum Historiae (1715).

Morison's figure was an almost exact copy from Cornut and his description compared the inflorescence to that of the grape. Insofar as Morison had any clear conception of the plant it was that of Cornut. The next reference, chronologically, was to Hortus Cliffortianus (1737), Linnaeus's own work and, therefore, representing his own concept. Two sheets of perfectly preserved specimens are in the Hortus Cliffortianus herbarium at the British Museum. For photographs of them I am indebted to the kindness of Mr. Ramsbottom. They are both marked in the hand of Linnaeus *Convallaria racemosa* and should stand as the types. The summit of one of them is shown, × 1, as our PLATE 512. Its nearly or quite sessile inflorescence and the many-flowered branches place it immediately with the northern series of specimens, although the panicle is too slender for the majority of them. Gronovius (1739) cited Hortus Cliffortianus, but the Clayton specimen before him was undoubtedly the southern plant. Royen (1740) cited Hortus Cliffortianus, and other old references not mentioned by Linnaeus; and Plukenet (1749) illustrated the northern plant. There is, therefore, preponderant weight of argument (including Linnaeus's own specimens illustrating his Hortus Cliffortianus) for maintaining the larger-panicled and shorter-peduncled northern plant as true *Smilacina racemosa*.

So far as I can find there is no available name for the southern series, with somewhat lesser stature and long-peduncled, shorter and more slender panicle with fewer-flowered branches. *Smilacina ciliata* Desf. in Ann. Mus. d'Hist. Nat. Paris, ix. 53, t. 9 (1807) might have been based on it but the strongly bifurcate and trifurcate panicles shown are as atypical as was Cornut's *Polygonatum ramosum*. It was a cultivated plant, not easily matched in nature. I am, therefore, calling the southern series

SMILACINA RACEMOSA (L.) Desf., var. **cylindrata,** var. nov. (TAB. 513), a var. typica recedit caule humile rare 7.5 dm. alto; foliis maximis maturis 0.85–1.7 dm. longis 3.5–6 cm. latis; pedunculo elongato; panicula cylindrata vel subcylindrata 4.5–8.5 (rare–13) cm. longa, 1.5–3 cm. diametro, ramis longioribus 1–2.5 cm. longis 6–10-floris.—Georgia to Arizona, north to southern New Hampshire, central and western Massachusetts, southern New York, southern Ontario, Ohio, Indiana, Illinois, Kansas and Colorado. TYPE: dry mixed woods, Little Neck, Princess Anne County, Virginia, August 8 and 9, 1934, *Fernald & Long*, no. 3859. In PLATE 513, FIG. 1 is a flowering summit, × 1, from Henrico County, Virginia; FIG. 2, the summit of the type, × 1.

The coarser northern plant is

Var. **typica.** *Convallaria racemosa* L. Sp. Pl. i. 315 (1753), excluding citation of Gronovius in part. *Smilacina racemosa* (L.) Desf. in Ann. Mus. d'Hist. Nat. Paris. ix. 51 (1807). *S. racemosa*, forma *foliosa* Victorin in Contrib. Lab. Bot. Univ. Montréal, no. 14: 15, fig. 1 (1929).—Quebec to British Columbia, south to Nova Scotia, New England, Long Island, Pennsylvania, upland and rich valleys of Virginia and Tennessee, Michigan, Illinois, Missouri, Arizona and Oregon. PLATE 512.

That the ranges of the two overlap is obvious, and in these bordering areas the transitions are also obvious. North and south of the transition belt the two extremes are striking.

The only material of var. TYPICA I have seen from the Coastal Plain of Virginia is from SURRY COUNTY: rich wooded gullies along James River, below Sunken Meadow Beach, *Fernald & Long*, no. 8200, there associated with many upland and northern types.

SMILAX PULVERULENTA Michx. SURRY COUNTY: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8203. See p. 382.

A species chiefly of the upland areas southward.

*NARCISSUS INCOMPARABILIS Mill. SOUTHAMPTON COUNTY: "soft shoulder" of road, Ivor, no. 7799, an escape from cultivation.

* ×N. BARRII Hort. SOUTHAMPTON COUNTY: with the last, no. 7800.

HYPOXIS LEPTOCARPA Engelm. & Gray. To the two stations already recorded from the county add the following, also in SOUTHAMPTON COUNTY: alluvial wooded bottomland of Meherrin River, near Haley's Bridge, no. 8213. NANSEMOND COUNTY: wooded bottomland of Somerton Creek, about 2 miles east of Factory Hill, no. 8674, leaves up to 7 dm. long and 1.4 cm. broad!

*SISYRINCHIUM CAPILLARE Bicknell. SUSSEX COUNTY: open pinelands about 4 miles northwest of Waverly, no. 8214. See p. 381.

First from north of North Carolina.

S. MUCRONATUM Michx. SURRY COUNTY: beech woods, slopes of gully 1½ miles north of Surry, no. 8216.

Our first Coastal Plain station in Virginia.

ORCHIS SPECTABILIS L. SURRY COUNTY: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8219; rich calcareous wooded gullies by James River, Claremont Wharf, nos. 7804, 8218; seen in similar habitat at Eastover. See p. 375.

Our first Coastal Plain stations in Virginia.

CLEISTES DIVARICATA (L.) Ames. SUSSEX COUNTY: sphagnous siliceous boggy depression just northwest of Wakefield, no. 7392, only

a few plants, which will soon be wiped out by broadening of the automobile road. See p. 367.

Spiranthes ovalis Lindl. To the single station (in Henrico County), already recorded, add Sussex County: alluvial woods, upper terrace of Nottoway River, southwest of Burt, no. 7394. Southampton County: alluvial wooded bottomland of Meherrin River, near Haley's Bridge. no. 8221. See pp. 366, 377.

Ponthieva racemosa (Walt.) Mohr. To the few recorded stations add one from Surry County: beech woods, slopes of gully 1½ miles north of Surry, no. 8222. See p. 383.

Aplectrum hyemale (Muhl.) Torr. Surry County: rich wooded slope at head of Sunken Meadow Creek, south of Claremont, no. 7805; seen also on calcareous wooded slopes at Claremont Wharf. See p. 375.

Populus deltoides Marsh. Banks and gullies along the James at least to Surry County. See p. 383.

*Myrica pusilla Raf. Dry or moist sandy pinelands, scattered to frequent in Southampton, Sussex and southern Isle of Wight Counties. Our specimens are from 4 miles northwest of Waverly, *F. & L.*, no. 6992; south of Zuni, no. 6994; about 7 miles south of Franklin, nos. 6987, 6989, 6995, 7404 and 7405; Cypress Bridge, no. 6993.

Myrica pusilla is the dwarf, usually freely stoloniferous and colonial shrub ranging from 2 to 10 dm. high, or very exceptionally, and then probably through crossing with *M. cerifera*, slightly higher, further separated from *M. cerifera* by its obtuse oblanceolate to narrowly obovate leaves only 1.5–4 cm. long and by its fruits 3–4 mm. in diameter (the leaves of *M. cerifera* acute and mostly 4–9 cm. long, the fruits 2–3 mm. in diameter). It was Michaux's *M. cerifera*, γ. *pumila*, "fruticulosa: foliis minoribus, magis cuneatis . . . in aridis, a Carolina ad Floridam," raised to specific rank by Small in 1896 as *M. pumila* (Michx.) Small, with no further elucidation of its characters than "It seems strange that this so-called variety of *Myrica cerifera* has never before been given specific rank." Fifty-eight years earlier, however, Rafinesque in his "Alsographia Americana, Or an American Grove of New or revised Trees and Shrubs of Genera Myrica," etc. had described 7 species of *Myrica*. His *M. pusilla* was, for him, an unusually well described species:

20. *Myrica pusilla* Raf. cerif. pumila Bartr? caule pumilo piloso angulato, fol. sessilib. obov. and cuneatis, apice ineq. serratis acutis, supra rugosis, subtus ferrugineis glabris, margine et nervo ciliatis—minute shrub, only 3 to 6 inches high, in Alabama and Florida, leaves very un-

equal and less than one inch long, Bartram calls them sinuate and yellow pulverulent.

There can be no question that Rafinesque had the dwarf, stoloniferous species of the southern coastal plain. The bibliography of the species is as follows.

Myrica pusilla Raf. Alsogr. Am. 10 (1838). *M. cerifera*, γ. *pumila* Michx. Fl. Bor.-Am. ii. 228 (1803); Chevalier, Mon. Myric. 180 [264] (1901). *M. pumila* (Michx.) Small in Bull. Torr. Bot. Cl. xxiii. 126 (1896). *Cerothamnus pumilus* (Michx.) Small, Shrubs of Fla. 8, 133 (1913).

Myrica heterophylla Raf.

In Rhodora, xxxvii. 423, 424 (1935), I pointed out that the coarse evergreen shrub or small tree with oblong to narrowly obovate leaves lustrous above but more or less pubescent beneath and with blackish branches permanently pubescent is *M. Curtissi* Chevalier, var. *media* (Michx.) Chevalier, Mon. Myric. 186 [270] (1901), based upon *M. cerifera*, β. *media* Michx. Fl. Bor.-Am. ii. 228 (1803), in part. This coarse shrub or small tree is common at the inner margin of the Coastal Plain in southeastern Virginia, and Mr. Long assures me that it is characteristic also of the inner Coastal Plain in southern New Jersey. It extends southward to Florida. In Florida and rarely northward to southeastern Virginia a variety with glabrous (instead of pubescent) branchlets occurs. This is typical *M. Curtissi* Chevalier, l. c. 185 [269].

Unfortunately, Chevalier did not have access to Rafinesque's Alsographia Americana, with its very full treatment of *Myrica*, for he cites it always with doubt or upon the authority of others. There can be no question that Rafinesque's *M. heterophylla* was *M. Curtissi*, var. *media*. It is probable, likewise, that Rafinesque's *M. sessilifolia* and its var. *latifolia* were phases of the same shrub. I quote Rafinesque's accounts.

17. *Myrica heterophyl[l]a* Raf. arborea, ramis nigrescens pubesc. fol. ellipt. and obov. subpet. integris vel apice grosse serratis acutis, utrinque glabris sed nervo medio supra and subtus pubescens—Carolina to Florida, probably one of the sp. blended in *M. cerifera*. name unmeaning since all bear wax: leaves larger broader and thinner than in last, sometimes opposite, or obliqual, or really elliptical. Seen alive in gardens.

18. *Myrica sessilifolia* Raf. fruticosa, ramis cinereis puberis, fol. sessilib. cuneatis acutis, apice parce serratis, glabris, nervo medio subt. puberis, margine revolutis ciliolatis, drupis subracem. globosis parvis granulatis cerulescens—on the Sea Shores from New Jersey to Florida,

shrub 4 to 8 feet high, leaves smaller uncial, berries small, probably the *M. cerifera pumila* of Mx. not Bartram, which is 20.

19. Var. *latif.* diff. fol. nonnulis obovatis integris, vel obl. cuneatis acutis vix serratis—with the last, probably the var. media of Mx.

Myrica Curtissi, var. *media* is characteristic of the *inner* Coastal Plain in New Jersey and Virginia and southward, not on the "Sea Shores," but from New Jersey to southeastern Virginia the northern deciduous-leaved *M. pensylvanica* Loisel. chiefly follows the coastal sands and dunes but occasionally pushes inland. Although it is probable that Rafinesque's *M. sessilifolia* and especially its var. *latifolia* were in part based upon the former species, it is better to retain for it the first of his names, *M. heterophylla,* for the blackish pubescent branches, the elliptic or obovate leaves pubescent beneath, and the range, Carolina to Florida, all clearly indicate the coarse shrub or small tree which Chevalier called *M. Curtissi,* var. *media.* The bibliography follows.

Myrica heterophylla Raf. Alsog. Am. 9 (1838). *M. cerifera,* β *media* Michx. Fl. Bor.-Am. ii. 228 (1803) in part. *? M. sessilifolia* and var. *latifolia* Raf. l. c. 10 (1838). *M. Curtissi,* var. *media* (Michx.) Chevalier, Mon. Myric. 186 [270] (1901).

Var. **Curtissi** (Chevalier), comb. nov. *M. Curtissi* Chevalier, Mon. Myric. 185 [269] (1901). To the station in Norfolk County previously noted by me add Southampton County: moist peaty and sandy depressions in pine barrens, about 7 miles south of Franklin, *F. & L.,* no. 7400. Isle of Wight County: sandy pine barrens south of Zuni, *F. & L.,* no. 6988.

In my earlier discussion I took up for the northern deciduous-leaved species which, southward, is strictly maritime, the name *M. pensilvanica* Loisel. Professor Rehder calls my attention to the fact that Loiseleur also spelled the specific name *pensylvanica.* Since the latter form was adopted by Chevalier in his monograph, this more usual spelling should prevail.

Comptonia peregrina (L.) Coulter, var. **asplenifolia** (L.), comb. nov. *Myrica asplenifolia* L. Sp. Pl. ii. 1024 (1753). Southampton County: dry sandy open pine and oak woods 6 to 7 miles south of Franklin, no. 8229. See Plate 514, figs. 1–6.

As noted on p. 379, *Comptonia* consists of two well defined varieties.

(1) A northern wide-ranging shrub with more or less pilose new branchlets and leaves; fruiting aments 1.5–2.5 cm. in diameter; nuts 4–5 mm. long; staminate aments subapproximate or approximate. Figs. 7–10.

(2) A smaller shrub of Coastal Plain pinelands or pine barrens, with new branchlets minutely puberulent only; smaller leaves more sparsely

short-puberulent or glabrous (except for midrib); fruiting aments only 0.8–1.5 cm. in diameter; nuts 3–4 mm. long; staminate aments more scattered. FIGS. 1–6.

Linnaeus, in preparing Species Plantarum (1753), had both shrubs. The wide-ranging and more northern and inland shrub (our no. 1) was his

> 2. LIQUIDAMBAR foliis oblongis sinuatis. *peregrina*
> *Habitat in* Canada. [Sp. Pl. 999].

The Coastal Plain shrub (our no. 2) was chiefly his

> *asplenifolia.* 3. MYRICA foliis oblongis alternatim sinuatis. *Hort. cliff.* 456. *Gron. virg.* 142. *Cold. noveb.* 224.
> Gale mariana, asplenii folio. *Pet. mus.* 773.
> Myrti brabanticae affinis americana, foliorum laciniis asplenii modo divisis. *Pluk. alm.* 250. *t.* 100. *f.* 6.7.
> *Habitat in* America septentrionali. ♄
> [Sp. Pl. 1024].

Colden's plant of New York was, of course, our no. 1. Otherwise, the plants which Linnaeus had before him (those of Hortus Cliffortianus, Gronovius and Plukenet) were chiefly our no. 2. Linnaeus's own work, Hortus Cliffortianus, merely refers to the treatment by Plukenet. Plukenet, who erroneously thought the shrub came from Brasil, although he had much material from Maryland and Virginia, gave two very clear figures (here reproduced as our figs. 1 and 2) showing the characteristic Coastal Plain shrub with no pilosity indicated, the very small fruiting ament and the remote young staminate aments. Our FIGS. 3 and 4 show parallel portions from our Virginian collection (no. 8229), while FIG. 5 indicates the puberulence, × 10, of the young branchlet, FIG. 6 the lower surface of the leaf of no. 8229, × 10. Gronovius merely referred to Hortus Cliffortianus, but cited two collections by Clayton, one (from Middlesex County on the Coastal Plain) doubtless our no. 2, the other (from shaded bluffs of North Anna River, in the interior) possibly our no. 1. In view, however, of the convergence of the more important Linnean references upon the Plukenet figures it is right to consider *Myrica asplenifolia* as based chiefly upon them and the specimens (at one time accessible to Linnaeus) upon which they were based.

As to the correct name to take up, usage through a century or more has favored *Myrica asplenifolia* (1753), while *Liquidambar peregrina*, published in the same work (1753), has been more often treated as a synonym. Linnaeus, however, settled the question when he united

the two in 1759, in his Systema Naturae, ed. 10, ii. 1273 (1759), treating them as *Liquidambar*

peregrina. 2. L. fol. oblongis sinuatis. Myrica asplenifolia. *Spec. pl.*

The two being first united under the specific name *peregrina* we are forced, unhappily, to take that as the correct specific name.

Briefly, the bibliography of the two is as follows,

Comptonia peregrina (L.) Coulter in Mem. Torr. Bot. Cl. v. 127 (1894); Chevalier, Mém. Soc. Sci. Nat. & Math. Cherbourg, xxxii. 196—repr. Monogr. Myric. 109 (1901). *Liquidambar peregrina* L. Sp. Pl. ii. 999 (1753), Syst. Nat. ed. 10, ii. 1273 (1759) in part. *C. Ceterach* Mirbel in Duham. Arb. ed. nov. ii. t. 11 (1804) in part. *Myrica Comptonia* (Banks) A. DC. Prodr. xvi^2. 151 (1864), largely. *M. peregrina* (L.) Ktze. Rev. Gen. Pl. 638 (1891). *C. peregrina,* var. *tomentosa* Chevalier, l. c. 196 [112] (1901)—Quebec to Manitoba, south to Virginia, West Virginia, Ohio, northwestern Indiana, Wisconsin and Minnesota, and in the upland to northern Georgia and Tennessee. Figs. 7–10.

Var. asplenifolia (L.) Fernald. *Myrica asplenifolia* L. Sp. Pl. ii. 1024 (1753), as to plant of Hortus Cliffortianus, Plukenet, etc., not of Colden. The names cited above as in part belonging to *C. peregrina* are in part, also, synonyms of var. *asplenifolia.*—Dry sandy pinelands and barrens of the Coastal Plain, Virginia to Long Island. Figs. 1–6.

Juglans cinerea L. Banks and gullies along the James at least to Surry County. See p. 375.

Ostrya virginiana (Mill.) Koch. The typical northern and inland tree, with glabrous branchlets, extending down the James at least to Surry County. See p. 382.

*Fagus grandifolia Ehrh., var. caroliniana (Loud.) Fern. & Rehder, forma mollis Fern. & Rehder. Southampton County: wooded slope, bordering river-swamp, Cypress Bridge, no. 6997.

Quercus montana L. (*Q. Primus* of authors, not L.) Surry County: rich woods and thickets back of sand-beach of the James, below Sunken Meadow Beach, no. 7238; seen at Eastover. See p. 382.

Isolated from the Piedmont area.

Q. laevis Walt. To the long-known station in Isle of Wight County add for Southampton County: dry sand, pine barrens about 7 miles south of Franklin, no. 7415. See p. 366.

Q. cinerea Michx. Southampton County: dry sand, pine barrens about 7 miles south of Franklin, nos. 7418, 7419, 8242. See p. 366.

Previously known in the state only at Cape Henry.

Q. borealis Michx., var. maxima (Marsh.) Ashe. Surry County:

rich alluvial woods and thickets back of the sand-beach of the James, Claremont Wharf, no. 8241; seen at Eastover. See p. 382.

A species of the interior.

ULMUS FULVA Michx. Follows down the James and near-by gullies to SURRY COUNTY. See p. 375.

LAPORTEA CANADENSIS (L.) Gaud. Follows down the James and near-by gullies at least to SURRY COUNTY. See p. 382.

THE GEOGRAPHIC VARIETIES OF POLYGONUM SETACEUM (PLATE 515). In eastern Virginia *Polygonum setaceum* occurs in three strikingly different phases: 1st, a plant of swamps of the outer Coastal Plain (in Princess Anne County thence up the valley of the James at least to Prince George County), with the leaves copiously long-strigose above and usually beneath (FIGS. 1 and 2); 2nd, a plant at the border of the Piedmont (Dinwiddie County and locally to Nansemond), with the leaves short-strigose above and short-strigose to glabrous beneath (FIGS. 3 and 4); 3rd, the plant of the rich alluvial bottoms of the inner Coastal Plain (Sussex, Southampton, Isle of Wight, Nansemond and James City Counties), with leaves nearly or quite glabrous on both surfaces. Obviously, these three plants do not all accord with Small's key-character: "leaf-blades copiously loosely strigose"; and study of the series in the Gray Herbarium indicates that the three are well defined geographic varieties. The first occurs from Florida to Texas, northward to Cape Henry, Virginia and up the lower James and, apparently isolated, in southern New Jersey; the second is more northern and inland, from Cape Cod to north-central New York, south to the outer Piedmont of Virginia; and it is in northern Indiana. The third is as yet known only from southeastern Virginia and in Oklahoma.

I am defining them as follows:

Leaf-surfaces (especially when young) strigose above.
  Strigosity of upper leaf-surface of mixed short and long hairs, the latter 0.8–1.5 mm. long; hairs of lower surface similar, usually abundant; ochreae copiously strigose-villous.....Var. *typicum*.
  Strigosity of upper leaf-surface wholly or chiefly of stiffer hairs only 0.2–0.5 (rarely –0.8) mm. long; lower surface similarly strigose or more often glabrous; ochreae more remotely strigose.....Var. *interjectum*.
Leaf-surfaces glabrous or essentially so; ochreae only sparsely strigose.....Var. *tonsum*.

P. SETACEUM Baldw., var. **typicum**. *P. setaceum* Baldw. ex Ell. Sk. i. 455 (1817).—Swamps, shores and low woods, Texas to Florida,

north to Princess Anne, Surry and Prince George Counties, Virginia; Cape May, New Jersey. Figs. 1 and 2.

*Var. **interjectum**, var. nov. (tab. 515, fig. 3 et 4), ochreis subremote strigosis; follis supra scabro-strigosis, strigis 0.2–0.5 (–0.8) mm. longis, subtus breviter strigosis vel glabratis.—Southeastern Massachusetts to Oswego County, New York, south to Dinwiddie County, Virginia; northwestern Indiana. Massachusetts: moist thicket along Doane Creek, Harwich, August 13, 1918, *Fernald & Long*, no. 16,749 (type in Gray Herb.); September 11, 1919, *Fernald* in Pl. Exsicc. Gray. no. 356; moist sandy overflow from cultivated cranberry bog, Doane Creek, Harwich, August 30, 1918, *Fernald & Long*, no. 16,750; brookside near mouth of Red River, Harwich, August 8, 1919, *Fernald & Long*, no. 18,402. Rhode Island: edge of bushy swamp, Westerly, August 25, 1924, *Weatherby*, no. 5361. New York: wet shore of Sweezy Pond, Southampton, July 26, 1920, *St. John*, no. 2703; along brooks in swampy woods and thickets overlying Silurian (Medina) sandstones, Mud Pond, Oswego, August 23, 1922, *Fernald, Wiegand & Eames*, no. 14,269. Virginia: border of swampy woods northwest of Carson, Dinwiddie County, September 14, 1937, *Fernald & Long*, no. 7429; low clearing, south of McKenney, Dinwiddie County, July 18, 1938, *Fernald & Long*, no. 8703; swale by tidal stream northeast of Suffolk, Nansemond County, July 21, 1938, *Fernald & Long*, no. 8701. Indiana: under *Cephalanthus*, edge of a *Chamaedaphne* bog near Rolling Prairie, La Porte County, July 31, 1920, *D. C. Peattie*.

*Var. **tonsum**, var. nov. (tab. 515, fig. 5 et 6), ochreis sparse strigosis; foliis utrinque glabris.—Virginia: open situation beside stream, 1½ miles west of Williamsburg, October 7, 1920, *Grimes*, no. 3170; alluvial woods, Coppahaunk Swamp, about 3 miles southeast of Waverly, September 10, 1937, *Fernald & Long*, no. 7428; swampy woods by Blackwater River, south of Zuni, August 24, 1936, *Fernald & Long*, no. 6589; siliceous and argillaceous alluvium bordering cypress swamp, bottomland of Nottoway River, above Cypress Bridge, July 23, 1936, *Fernald & Long*, no. 6198 (type in Gray Herb.; isotype in Herb. Phil. Acad.); margin of Somerton Creek, Factory Hill, July 20, 1938, *Fernald & Long*, no. 8700. Oklahoma: "common," Sapulpa, September 25, 1894, *Bush*, no. 509 (young foliage sparsely strigose).

Paronychia canadensis (L.) Wood. See Rhodora, xxxviii. 418 (1936). Sussex County: rich wooded slope, 4 miles south of Stony Creek, no. 8254.

*Spergula arvensis L., var. sativa (Boenn.) Reichenb. Sussex County: weed in roadside fill ("soft shoulder"), recently seeded, about 4 miles south of Jarratt, no. 7817. See p. 373.

Stellaria pubera Michx. Extending into the Coastal Plain in

PRINCE GEORGE COUNTY: sandy, loamy wooded slopes along Powell's Creek, Garysville, no. 7818. See p. 375.

*CERASTIUM TETRANDRUM Curtis. SUSSEX COUNTY: weed in sandy field, Wakefield, no. 7819. See p. 373.

A European species not heretofore recognized in this country.

HOLOSTEUM UMBELLATUM L. GREENSVILLE COUNTY: cultivated field 1 mile south of Emporia, no. 7820. See pp. 372, 373.

Very local in eastern Virginia.

SILENE CAROLINIANA Walt. SURRY COUNTY: rich woods on fossiliferous sandy slopes of gullies near Claremont Wharf, no. 7822. DINWIDDIE COUNTY: plentiful in sandy woods by Steere's Millpond, east of Burgess, *Meade Lewis* (our no. 8257).

S. VIRGINICA L. GREENSVILLE COUNTY: rich deciduous woods by Metcalf Branch, east of Emporia, no. 8258. See p. 380.

Our only station on the Coastal Plain of Virginia; the plants are of the form with petals only shallowly notched or emarginate, instead of deeply cleft. Further consideration may show this difference to have phytogeographic significance.

S. STELLATA (L.) Ait. f. SOUTHAMPTON COUNTY: border of sandy woods about 3 miles east of Drewryville, no. 7434. SURRY COUNTY: rich wooded slope by James River, Eastover, no. 8708. HENRICO COUNTY: border of woods, Elko Station, no. 8709.

Our only Coastal Plain stations, although Grimes had two additional ones on the Peninsula of Virginia.

*CLAYTONIA VIRGINICA L., forma **micropetala**, f. nov. (TAB. 516, FIG. 1), forma petalis anguste oblongis 3–5 mm. longis; staminibus valde exsertis.—VIRGINIA: a small colony, in the midst of abundant typical *C. virginica*, loamy wooded slope along tributary of Chippoak Creek, east of Cabin Point, Surry County, April 5, 1938, *Fernald & Long*, no. 7823 (TYPE in Gray Herb.; ISOTYPE in Herb. Phil. Acad.).

Typical and abundant *Claytonia virginica* (FIG. 2) has the large and broad petals conspicuously longer than the sepals and definitely exceeding the stamens. Forma *micropetala*, occurring in the midst of the ordinary plant, is a striking sport.

*NYMPHAEA ALBA (L.) Presl, forma ROSEA Hartm. f. DINWIDDIE COUNTY: thoroughly naturalized (dominating) in peaty spring-fed pond, Century House, northeast of Burgess, no. 7436. See p. 368.

BRASENIA SCHREBERI Gmel. DINWIDDIE COUNTY: peaty spring-fed pond, Century House, northeast of Burgess, no. 7437. PRINCE GEORGE COUNTY: Miner's Pond, about 3 miles south of Petersburg, no. 8262.

RANUNCULUS AMBIGENS Wats. To the single station (in Chester-

field County) already recorded add one in Southampton County: alluvial wooded bottomland of Meherrin River, near Haley's Bridge, no. 8263.

Ranunculus abortivus and its Eastern American Allies (Plates 517–519). *Ranunculus abortivus* L., as treated by Gray, was a very inclusive species. By the removal of *R. alleghenienses* Britton (pl. 517, fig. 1), *R. micranthus* Nutt. (pl. 517, figs. 2 and 3) and *R. Harveyi* (Gray) Britton (pl. 517, fig 4) it becomes greatly simplified but it is still a highly variable type in which I recognize 4 geographic varieties. In order to clarify the species I append a key to the small group to which it belongs, in the area covered by Gray's Manual. Since some of these have not been adequately illustrated I am including photographs to show at least the diagnostic characters; and am giving a statement of range of each.

a. Achenes 1.5–2 mm. long, with firm subulate beak.
Stems weak, flexuous, villous, 1–4-flowered; sepals spreading, 3–5 mm. long; petals 4–6 mm. long; alpine species.... *R. Allenii.*
Stems firm, erect, glabrous, corymbose-cymose, many-flowered; sepals reflexed, 2.5–3.5 mm. long; petals 1.5–2.3 mm. long; Alleghenian species..... *R. alleghenienses.*

a. Achenes 1.1–1.5 mm. long, the beak obsolete or soft and minute.
Roots slender and fibrous; simple radical leaves 1–9.5 cm. broad, with 9–43 marginal teeth; sepals 2.5–5 mm. long, sessile; fruiting heads 3–4.5 mm. thick; achenes lustrous; receptacle hairy..... *R. abortivus.*
Roots fusiform-thickened; simple radical leaves 0.8–2.5 cm. broad, with 5–13 marginal teeth; sepals 2–3.5 mm. long, abruptly contracted to a claw; fruiting heads 2.5–3.3 mm. thick; achenes dull; receptacle glabrous.
Uncleft basal leaves cuneate, rounded or barely subcordate at base, often mixed with divided ones; petals 2–3.5 mm. long, about equaling sepals..... *R. micranthus.*
Uncleft basal leaves cordate or subcordate, rarely mixed with divided ones; petals 4–8 mm. long, much exceeding sepals..... *R. Harveyi.*

R. Allenii Robinson in Rhodora, vii. 220 (1905).—Wet gravel and flood-plains of alpine brooks, northern Labrador and Shickshock Mts. Quebec. Pl. 517, figs. 5 and 6.

R. alleghenienses Britton in Bull. Torr. Bot. Cl. xxii. 224 (1895). *R. abortivus*, form, Hook. Fl. Bor.-Am. i. 15 (1829).—Rich woods and rocky calcareous or basic slopes, rarely in meadows, rather local, Massachusetts to Ohio, south to North Carolina and Tennessee. Pl. 517, fig. 1.

R. abortivus L. See below.

R. micranthus Nutt. in Torr. & Gray, Fl. N. Am. i. 18 (1838). *R. abortivus*, var. *micranthus* (Nutt.) Gray, Man. ed. 2: 9 (1856).—

Thin soil, chiefly on rocky or dryish slopes in slight shade, Massachusetts to Illinois, south to Georgia, Alabama and Arkansas. PL. 517, FIGS. 2 and 3.

R. HARVEYI (Gray) Britton in Mem. Torr. Bot. Cl. v. 159 (1894). *R. abortivus*, var. *Harveyi* Gray in Proc. Am. Acad. xxi. 372 (1886).—Ledges, bluffs and ravines, western Alabama, Missouri and Arkansas. PL. 517, FIG. 4.

To *Ranunculus Harveyi* I refer plants from a rich shady ravine near Warrior River about 8 miles above Tuscaloosa, Alabama, April 14, 1932, *R. M. Harper*, and April 19, 1934, *Harper*, no. 3181.

Ranunculus abortivus ordinarily has all the upper cauline leaves and frequently the lower cauline ones deeply divided into narrow segments or leaflets. It was, therefore, a great surprise to Mr. Long and me to find (see p. 374) in early April, 1938, that a plant of the bottomlands of the Nottoway River in Sussex County, Virginia, the only known region for *Geum canadense*, var. *brevipes* Fernald in RHODORA, xxxix. 410, t. 479, figs. 1–3 (1937), had the cauline leaves quite simple throughout. This was the common plant along the main Nottoway and also along its tributary, Three Creek, in Southampton County. I can find no material to match it, but some from Newfoundland and Gaspé suggests an approach to it. The suggestion, however, is superficial only, for the peduncles and upper internodes of the northern plants are minutely pilose, those of the southern plant quite glabrous. With these points in mind I have studied all the material of *R. abortivus* in the Gray Herbarium and the herbarium of the New England Botanical Club and present the following synopsis of its varieties.

a. Basal uncleft leaves merely cordate at base, with open sinuses . . . . *b.*
  b. Peduncles, upper internodes and leaf-surfaces glabrous or essentially so.
    Uppermost and often all cauline leaves divided to base into narrow segments; radical leaves simple or some of them divided . . . . . *R. abortivus*, var. *typicus.*
    All cauline as well as radical leaves simple and undivided. Var. *indivisus.*
  b. Young peduncles (at least toward base), upper internodes and often the surfaces of youngest cauline leaves minutely pilose . . . . . Var. *acrolasius.*
a. Basal uncleft leaves orbicular, with a narrow or nearly closed sinus . . . . . Var. *eucyclus.*

R. ABORTIVUS L., var. **typicus.** *R. abortivus* L. Sp. Pl. i. 551 (1753). *R. nitidus* Walt. Fl. Carol. 159 (1788).—Low woods, thickets, clearings and damp slopes, northern Florida to Oklahoma, north to southern Maine, south-central New Hampshire, Vermont, New York, Ohio, Michigan, Wisconsin, Minnesota and southern Saskatchewan.

There is scarcely a doubt that the type of *Ranunculus abortivus* is the common plant of Atlantic United States with cleft cauline leaves and glabrous stems and peduncles. Linnaeus described it from "Virginia, Canada"; but most of his references go back to the Virginian plant. I am, therefore, typifying the species, should it prove that there was a mixture, by "Ranunculus foliis radicalibus reniformibus crenatis petiolatis; caulinis paucis digitatis sessilibus. *Gronov. virg.* 166," cited by Linnaeus and the basis of the Virginian references. All material from Virginia and adjacent states is quite glabrous.

*Var. **indivisus**, var. nov. (TAB. 518), planta glabra; foliis omnibus indivisis, basilaribus reniformibus crenatis; foliis caulinis imis petiolatis late flabellatis vel breviter ovatis, superioribus flabellatis vel obovatis vel oblongis crenatis vel leviter lobatis.—Bottomland woods of the Nottoway River system, Sussex and Southampton Counties, VIRGINIA: Nottoway River, southwest of Burt, April 3, 1938, *Fernald & Long*, no. 7827; Nottoway River, northwest of Lumberton, April 3, 1938, *Fernald & Long*, no. 7828; Three Creek, Drewryville, April 9, 1938, *Fernald & Long*, no. 7829 (TYPE in Gray Herb., ISOTYPE in Herb. Phil. Acad.); Nottoway River at Cypress Bridge, June 16, 1938, *Fernald & Long*, no. 8264.

The fresh plants of var. *indivisus* were a dark lustrous green, strongly contrasting with the few plants present of var. *typicus*, which appeared duller and of a yellowish green.

Var. **acrolasius**, var. nov. (TAB. 519, FIG. 1 et 2), planta habitu var. *typico* simillima; pedunculis juvenilibus internodiis superioribusque minute pilosis; foliis superioribus juvenilibus plerumque pilosis.—Southern Labrador to British Columbia, south through Canada and northern New England, locally to Massachusetts, northern Rhode Island, northern Connecticut, western New York, northern Michigan, Black Hills of South Dakota and Wyoming, and along the Rocky Mountains to Colorado. The following, from a large series, are typical. LABRADOR: Forteau, *Fernald & Wiegand*, no. 3418; Blanc Sablon, *Fernald & Wiegand*, no. 3417. NEWFOUNDLAND: Bear Cove, Straits of Belle Isle, *Wiegand & Pease*, no. 28,261; Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1699; Ingornachoix Bay, *Fernald & Wiegand*, no. 3419; St. Anthony, *E. C. Abbe*, no. 339; Grand Falls, *Fernald & Wiegand*, no. 5435. QUEBEC: Pointe-aux-Esquimaux, Seign. de Mingan, *St. John*, no. 90,462; Mont Saint-Pierre, *Rousseau*, no. 31,181; Mt. Collins, *Fernald et al.*, no. 25,757; Bic, *Fernald & Collins*, no. 1039; Longueuil, *Victorin*, no. 4286; Sand Pit Island, James Bay, *Potter*, no. 367; Rupert House, James Bay, *Potter*, no. 366. MAGDALEN ISLANDS: Brion Island, *St. John*, no. 1883. PRINCE EDWARD ISLAND: Alberton, *Fernald & St. John*, no. 7486;

Bear River, *Fernald & St. John*, no. 11,059. NEW BRUNSWICK: St. Jacques, Madawaska, *Pease*, no. 2421. NOVA SCOTIA: Truro, June 15, 1883, *J. Macoun*. MAINE: Masardis, *Fernald*, no. 2206; Island Falls, *Fernald*, nos. 2207, 2218; Orono, *Fernald* nos. 2208, 2209, 2211; Dover, *Geo. B. Fernald*, no. 19; Pittston, Somerset Co., *St. John & Nichols*, no. 2294; Perry, *Fernald*, no. 1777; Southwest Harbor, June 6, 1888, *Rand;* Matinicus, *C. A. E. Long*, no. 71; Vassalboro, May 5, 1902, *Chamberlain;* North Berwick, *Parlin*, no. 1242. NEW HAMPSHIRE: Pittsburg, *A. H. Moore*, no. 3706; Stratford Hollow, *Pease*, no. 13,535; Headwall of Tuckerman's Ravine, July, 1858, *E. S. Hoar*, July 21, 1909, *Pease*, no. 12,047; Shelburne, May 17, 1910, *Deane* (TYPE in Herb. N. E. Bot. Cl.); West Lebanon, May 9, 1900, *Kennedy;* Piermont, May 26, 1933, *Knowlton;* Hampton Falls, May 21, 1914, *Batchelder;* Peterborough, May 7, 1927, *Batchelder;* Jaffrey, *Rand & Robinson*, no. 93. VERMONT: Island Pond, June 12, 1932, *Weatherby, Upham & Rossbach;* Mt. Mansfield, July 2, 1897, *Williams;* Morristown, May 30, 1923, *Knowlton;* Ripton, June 10, 1902, *Brainerd;* Whitingham, *St. John & Hill*, no. 12,059. MASSACHUSETTS (all specimens seen): Danvers, June, 1896, *J. H. Sears;* Cascade Rocks, Melrose, *Pease*, no. 1881; Lexington, May 6, 1882, *Deane;* Belmont, May 1, 1906, *Batchelder;* Gill, May 11, 1912, *St. John & Weatherby;* Monroe, *Hill & St. John* (*St. John*, no. 1697); Greenfield, May 11, 1912 *Batchelder, Kennedy & Williams;* Lanesboro, May 22, 1916, *Churchill.* RHODE ISLAND (all seen): Lincoln, May 15, 1904, *Williams.* CONNECTICUT: (all seen): Tariffville, May 17, 1913, *Winslow & Hill.* NEW YORK (all seen): "W. New York," *Gray.* ONTARIO: Kingston, May 11, 1901, *Fowler;* Bear Island, Temagami Forest Reserve, *W. R. Watson*, no. 1655; Tobermory, Bruce Co., *Krotkov*, no. 7445; Pic River, Algoma District, *Loring;* Jack Fish, Thunder Bay Distr., *Pease & Bean*, no. 23,338. MICHIGAN: Keweenaw County, *Farwell*, no. 147. MANITOBA: Mile 214, Hudson Bay Ry., July 8, 1917, *J. H. Emerton;* Lake Winnipeg Valley, 1857, *Bourgeau.* SOUTH DAKOTA: Bald Hills, Black Hills Nat. Forest, *Murdoch*, no. 4067. SASKATCHEWAN: locality not stated, 1857–8, *Bourgeau.* ALBERTA: vicinity of Rosedale, *Moodie*, no. 972. MONTANA: Bozeman, May 24, 1901, *E. J. Moore.* WYOMING: Black Hills, *Nelson*, no. 9463; Sundance Creek, *Nelson*, no. 2115. COLORADO: "Rocky Mountains, Lat. 39°–41°," *Hall & Harbour;* Dudley's Ranch, *E. L. Greene;* La Platte Cañon, *E. L. Hughes*, no. 21. BRITISH COLUMBIA: Lower Frazer River, 1859, *Lyall;* International Boundary between Kettle and Columbia Rivers, *J. M. Macoun*, no. 63,484.

Presumably on account of the pubescence of the young parts *Ranunculus abortivus*, var. *acrolasius* was identified by Gray with the quite distinct *R. micranthus*, and collections from others are so identified. At the southern parts of its range it clearly passes into var. *typicus*, several specimens being quite transitional. The geographic

separation of the glabrous (except for occasional ciliolate upper leaves) var. *typicus* and var. *acrolasius* is clearly brought out by the facts that all material seen by me from south of northern Connecticut, western New York and northern Michigan is definitely var. *typicus;* while all material from Newfoundland, and essentially all from Canada and the Black Hills and Rocky Mountain region is var. *acrolasius*, although var. *typicus* doubtless reaches southern Ontario. From Maine I have before me 4 collections of var. *typicus* (from Lincoln, Cumberland and York Counties—all in the south) but 30 sheets of var. *acrolasius*, from all parts of the state; from Massachusetts 97 sheets of var. *typicus* but only the 8 cited of var *acrolasius;* while from Rhode Island and Connecticut only one specimen from each state has been seen of var. *acrolasius*.

Var. EUCYCLUS Fernald in RHODORA, i. 52 (1899).—Newfoundland to western New York and western Connecticut. PL. 519, FIG. 3. Since no type was designated when var. *eucyclus* was published, I am here designating as TYPE the collection which originally called attention to this extreme: low woods, Gilead, Maine, August 10, 1897, *Kate Furbish*, in Gray Herb. The characteristic radical leaf of the TYPE is shown, × 1, in PLATE 519, FIG. 3.

*R. SARDOUS Crantz. (*R. parvulus* L.) SOUTHAMPTON COUNTY: roadside ditch in alluvial wooded bottomland of Meherrin River, near Haley's Bridge, no. 8265.

A European species now becoming naturalized.

MYOSURUS MINIMUS L. PRINCESS ANNE COUNTY: field, Virginia Beach, April 18, 1909, *E. B. Bartram*. SURRY COUNTY: shaded dooryard, Surry, no. 7837. SOUTHAMPTON COUNTY: argillaceous and siliceous cotton-field north of Sebrell, no. 7836. See pp. 372, 373.

The doubt implied in Gray's Manual, ed. 7, by the wording, "reported from e. Va.," is removed; but the plant is there certainly an introduction, presumably from Europe.

THALICTRUM REVOLUTUM DC. SURRY COUNTY: calcareous, fossiliferous bushy slope, near head of Sunken Meadow Creek, south of Claremont, no. 8266; seen in similar habitat at Eastover. See p. 382.

Our only Coastal Plain stations.

ANEMONELLA THALICTROIDES (L.) Spach. Extending eastward to PRINCE GEORGE COUNTY: sandy, loamy wooded slopes along Powell's Creek, Garysville, no. 7838. See p. 375.

HEPATICA AMERICANA (DC.) Ker. Eastward on slopes of gullies near the James at least to SURRY COUNTY: wooded slopes along

tributary of Chippoak Creek, east of Cabin Point, no. 7839; seen at Eastover. See p. 375.

CLEMATIS OCHROLEUCA Ait. To the single Coastal Plain station (in Sussex County) already reported add the following. DINWIDDIE COUNTY: dry woods by Steere's Millpond, east of Burgess, *Meade Lewis* (our no. 8270), also 8271. GREENSVILLE COUNTY: rich woods near Metcalf Branch, east of Emporia, no. 7840. See p. 374.

CALTHA PALUSTRIS L. SURRY COUNTY: by brook in drained cypress swamp, Claremont Wharf, no. 7841. See p. 382.

CIMICIFUGA RACEMOSA (L.) Nutt. SURRY COUNTY: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8274; seen in similar habitat at Eastover. See pp. 375, 383.

MENISPERMUM CANADENSE L. SURRY COUNTY: rich alluvial woods and thicket back of sand-beach of James River, Claremont Wharf, nos. 7845, 8276; also seen at Eastover. See pp. 375, 382.

PERSEA PALUSTRIS (Raf.) Sarg. Our most inland station is in NANSEMOND COUNTY: swampy pine woods near Crismond, no. 7440.

SANGUINARIA CANADENSIS L., var. ROTUNDIFOLIA (Greene) Fedde. Frequent in rich woods eastward to SURRY, ISLE OF WIGHT and SOUTHAMPTON COUNTIES.

DRABA BRACHYCARPA Nutt. Closely approaching the Coastal Plain in BRUNSWICK COUNTY: mossy pasture by Meherrin River, northeast of Brodnax, no. 7045; and in MECKLENBURG COUNTY: old pasture and roadside, north bank of Roanoke River, near Goode's Ferry, no. 7044. See p. 364.

*TEESDALIA NUDICAULIS (L.) R. Br. SUSSEX COUNTY: roadside fill ("soft shoulder"), recently seeded, about 4 miles south of Jarratt, no. 7840. See p. 373.

European species, now becoming frequent, from southeastern Massachusetts to North Carolina (verbal report by the botanists of North Carolina State College).

*RAPHANUS RAPHANISTRUM L., forma SULPHUREUS (Babey) Hayek. SUSSEX COUNTY: with the last, no. 7852.

Petals clear yellow, without the dark stripes of typical *R. Raphanistrum*.

DENTARIA LACINIATA Muhl. Eastward in rich woods at least to SURRY and GREENSVILLE COUNTIES. See p. 375.

*DENTARIA LACINIATA Muhl., var. **coalescens,** var. nov. (TAB. 520), foliis simplicibus laminis lanceolatis oblanceolatis vel obovatis digitato- vel pinnatifido-incisis.—VIRGINIA: rich woods, Great Neck, Princess Anne County, May 5, 1935, *Fernald & Griscom,* no. 4413 (TYPE in Gray Herb.).

Throughout its broad inland range *Dentaria laciniata* has 3 definite leaflets; these may be simply sharp-toothed or lacerate or the lateral

leaflets may have 2–4 variously toothed segments. So far as our experience has shown it does not occur on the outer Coastal Plain of Virginia; and Grimes did not find it on the Peninsula of Virginia. In the Piedmont section of the state it is found, and it occurs locally in calcareous gullies of streams entering the James as far eastward as Claremont in Surry County. The area where var. *coalescens* abounds is between the open Atlantic and Lynnhaven Bay, at least 50 miles southeast of Claremont; and its associates are a remarkable series of isolated Piedmont, Appalachian Upland or inland types: *Uniola sessiliflora* Poir., *Smilax herbacea* var. *lasioneuron* (Hook.) DC., *Menispermum canadense* L. (also at Claremont), *Desmodium paucifloruni* Michx., *Erigeron pulchellus* Michx. (also at Claremont), *Silphium atropurpureum* Retz., *Heliopsis helianthoides* var. *solidaginoides* (L.) Fernald, and *Senecio aureus* L. (southeast along tributaries of the James at least to Claremont). Isolated by at least 50 miles from typical *Dentaria laciniata*, the peculiar plant of Great Neck has apparently been able to diverge along a new line in its merely cleft or lobed leaves. When we originally found the plant in some abundance Mr. Griscom and I were greatly puzzled by it; and the material remained without identification for a full year. Then, since it has the hirsute rachis of the inflorescence and the characteristic siliques and nearly the tubers of *D. laciniata*, I temporarily called it that.

Cardamine bulbosa (Schreb.) BSP. Local on the Coastal Plain. Sussex County: springhead in bottomland-woods, Warwick Swamp, northwest of Waverly, no. 7856. Southampton County: wooded bottomland of Meherrin River, near Haley's Bridge, no. 7857.

Arabis virginica (L.) Poir. A rather local weed, maturing early (March and April) and perhaps overlooked. Greensville County: cultivated field 1 mile south of Emporia, no. 7054. Southampton County: argillaceous and siliceous cotton-field north of Sebrell, no. 7859. Sussex County: argillaceous and siliceous cotton-field south of Littleton, no. 7858. See pp. 364, 372, 373.

A. laevigata (Muhl.) Poir. Surry County: rich wooded gullies along James River, below Sunken Meadow Beach, no. 8278; seen in similar habitat at Eastover and at Claremont Wharf. Prince George County: rich woods, Coggins Point, no. 9055. See p. 382.

In 1903, in describing *Arabis georgiana*, Harper referred to it as "the first *Arabis* reported from the coastal plain of the eastern United States with the exception of *A. virginica*" (Harper in Torreya, iii. 88). Hopkins has noted three other species which overlap into the Coastal

Plain: *A. lyrata*, *A. canadensis* and *A. Drummondi*. *A. laevigata*, locally very abundant, adds another to the list.

SARRACENIA PURPUREA L., var. VENOSA (Raf.) Fern. Additional stations in SUSSEX, SOUTHAMPTON and GREENSVILLE COUNTIES.

S. FLAVA L. Additional stations in DINWIDDIE and GREENSVILLE COUNTIES. See pp. 367, 368.

DROSERA CAPILLARIS Poir. To the recorded stations in Dinwiddie, Prince George and Sussex Counties add the following. SOUTHAMPTON COUNTY: moist peaty and sandy depressions in pine barrens, about 7 miles south of Franklin, no. 7444. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, nos. 8719, 9018; peaty openings bordering wooded swamp north of Skipper's, no. 9057. NANSEMOND COUNTY: moist sandy field north of Factory Hill, no. 8279.

D. BREVIFOLIA Pursh. To the recorded stations in Nansemond and Elizabeth City Counties add one in GREENSVILLE COUNTY: wet cut-over sphagnous pine and oak woods near Three Creek, north of Emporia, no. 8280. See p. 378.

SEDUM NEVII Gray. Approaching the Coastal Plain in MECKLENBURG COUNTY: rocky wooded slope, south bank of Roanoke River, Goode's Ferry, no. 7056. See p. 364.

S. TERNATUM Michx. Extending locally into the Coastal Plain. PRINCE GEORGE COUNTY: sandy alluvium, bottomland of Powell's Creek, Garysville, no. 7861. SURRY COUNTY: rich wooded gullies along James River, below Sunken Meadow Beach, no. 8281; and seen in similar habitat at Eastover. See pp. 375, 382.

SAXIFRAGA VIRGINIENSIS Michx. Reaching the inner margin of the Coastal Plain in GREENSVILLE COUNTY: alluvial woods by Three Creek, 2 miles north of Emporia, no. 7057. See p. 375.

HEUCHERA AMERICANA L. Extending locally eastward to SURRY COUNTY: rich woods on fossiliferous sandy slopes of gullies near Claremont Wharf, no. 7862; rich wooded gullies along James River, below Sunken Meadow Beach, no. 8282; seen also at Eastover; and SUSSEX COUNTY: rich woods, Moore's Mill, no. 7446. See p. 375.

HYDRANGEA ARBORESCENS L. Extending eastward to SURRY COUNTY: rich woods on fossiliferous sandy slopes of gullies near Claremont Wharf, no. 7863; rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8284; rich wooded gullies along James River, below Sunken Meadow Beach, no. 8285; seen also at Eastover; and GREENSVILLE COUNTY: rich woods by Metcalf Branch, east of Emporia, *F. G. & L.*, no. 6601 (distributed as from Caney Branch). See pp. 374, 375.

PHYSOCARPUS OPULIFOLIUS (L.) Maxim. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, below Sunken Meadow Beach, no. 8289. See p. 382.

*Pyrus serotina Rehder. Surry County: naturalized in rich woods, west of Bacon's Castle, no. 7867.

An Asiatic species introduced into cultivation in the middle of the last century.

(*To be continued*)

NOTEWORTHY PLANTS OF SOUTHEASTERN VIRGINIA

M. L. Fernald

(*Continued from p. 424*)

Rubus occidentalis L. Sussex County: rich deciduous woods south of Stony Creek, no. 8303. Noted locally eastward to Surry County.

*R. phoenicolasius Maxim. Southampton County: alluvial woods, bottomland of Three Creek, Drewryville, no. 7880.

*Rubus (Cuneifolii) **Longii,** sp. nov. (tab. 521 et 522), arcuato-adscendens vel deinde depressus; turionibus 6 dm. altis pilosis glabratisque aculeis 4–6 mm. longis basi dilatatis rectis numerosis armatis; foliis primariis 3-foliolatis longe petiolatis, petiolis cinereo-villosis remote armatis, foliolis imis 5–7 cm. longis 3.5–5 cm. latis oblique rhomboideo-ovalibus lobatis vel divisis subtus densissime cinereo-tomentosis supra dense pilosis abrupte acuminatis grosse duplicato-serratis basi subcuneatis integrisque; foliolis terminalibus elliptico-ovatis vel obovatis basi rotundatis; caulibus fructiferis valde arcuatis; foliis trifoliolatis, foliolis ellipticis 2.5–3.5 cm. longis subtus cinereo-pilosis anguste serratis; inflorescentia corymbiformi basi foliosa; rhachibus villoso-tomentosis; pedicellis valde adscendentibus villoso-tomentosis plus minusve armatis; sepalis oblongis tomentosis apice breviter caudatis; fructibus subglobosis 1.7–2 cm. diametro.—Sussex County, Virginia: bushy margin of a peaty and argillaceous swale north of Littleton, June 10, 1938, *Fernald & Long,* no. 8298 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

Rubus Longii is so distinctive a blackberry that it at once won the enthusiasm of my companion, who, ordinarily, was as willing as I to pass the average run of *Rubus* (except to test the fruits, in *R. Longii* of superior quality). In its primocanes, with their leaves chiefly 3-foliolate, it is apparently a member of the *Cuneifolii*. From the stiffly ascending *R. cuneifolius* Pursh, which has smaller subtruncate to round-tipped leaflets white-pannose beneath, it differs at once in the larger abruptly acuminate leaflets with a longer cinereous tomentum beneath, and its corymbs have acuminate-tipped leaflets and fewer prickles. Furthermore the fruiting canes are low-arching to depressed. Bailey, Gentes Herbarum, ii. fasc. vi. (1932), recognizes, besides *R. cuneifolius*, three species of the *Cuneifolii*. *R. audax* Bailey, a "diffuse open tall harsh crabbed briar" of southern Florida, has the leaflets of the floricanes strongly rounded, instead of acuminate. *R. probabilis* Bailey, which occurs in eastern Virginia, is a taller shrub with leaflets of the glabrous primocanes oblong, often in 5's, and glabrous (instead of pilose) above, the inflorescence strongly armed. *R. inferior* Bailey, a prostrate or diffuse plant of Florida, has narrower and smaller leaflets without acumination and strongly armed pedicels.

If *Rubus Longii* be sought in the *Arguti* it might be placed near *R. frondosus* Bigel. or with *R. multispinus* Blanchard. Both of these are much coarser and larger-leaved plants, with glabrous primocanes bearing chiefly 5-foliolate leaves with glabrous petioles; *R. Longii*, a much smaller plant, having pilose primocanes with mostly 3-foliolate leaves strongly pilose above, cinereous-tomentulose beneath and on densely villous petioles.

The type-station of *Rubus Longii* is our only locality in Virginia for *Polygala ramosa* and *Acerates floridana*. See p. 378.

ALCHEMILLA MICROCARPA Boiss. & Reut. NORFOLK COUNTY: near Norfolk, May 15, 1832, *Wm. Darlington*. PRINCESS ANNE COUNTY: sandy open ground near beach, Virginia Beach, May 17, 1912, *B. L. Robinson*, no. 325. HENRICO COUNTY: "Hollywood," Richmond, May 5, 1894, *J. R. Churchill*. BEDFORD COUNTY: without stated locality, June 3, 1871, *A. H. Curtiss*.

This is the little annual (of § *Aphanes*) which has passed in eastern America as *Alchemilla arvensis* (L.) Scop. It is abundantly distinct from the European *A. arvensis* in its small leaves and minute flowers. Rydberg, taking it for an endemic native of the South, described it as

Aphanes australis Rydberg in N. Am. Fl. xxii. 380 (1908); but it perfectly matches the southern European (of Spain, Sardinia, etc.) *Alchemilla microcarpa* Boissier & Reuter. It was doubtless early introduced into the South and such habitats noted on labels, as "low pasture," "door-yard," etc., definitely suggest that it is an introduced weed. Dr. Lily M. Perry kindly calls my attention to an earlier reduction of *Aphanes australis* Rydb. to *Alchemilla microcarpa* by Rothmaler in Fedde, Repert. xxxviii. 40 (1935).

Rosa carolina L. (*R. humilis* Marsh.). Seen by us only rarely on the Coastal Plain of Virginia. Dinwiddie County: border of swampy woods east of Burgess, no. 8304. Noted in Greensville County.

R. carolina, var. glandulosa (Crépin) Farwell. Seen by us only once on the Coastal Plain of Virginia. Greensville County: rich deciduous woods by Metcalf Branch, east of Emporia, no. 8305. See p. 380.

Crotalaria angulata Mill. (*C. rotundifolia* (Walt.) Poir.). To the stations in Nansemond and Isle of Wight Counties add two from Southampton County: border of sandy woods about 3 miles east of Drewryville, no. 7455; dry sandy pine and oak woods about 7 miles south of Franklin, no. 8312.

I am indebted to Dr. H. A. Senn for calling my attention to the earliest name for the species.

C. Purshii DC. To the stations already reported add two in Southampton County: border of sandy woods, Hart's Bridge, no. 8313, exceptionally large plants, with stems up to 4.5 dm. high; border of sandy woods, Mars Hill Church, no. 9063, plants 6 dm. high! See p. 378.

*C. spectabilis Roth (*C. Retzii* Hitchc.). Sussex County: dry field, Homeville, no. 7456. See p. 372.

*Wisteria sinensis Sweet. Sussex County: woods, south of Littleton, thoroughly naturalized, climbing high over trees, no. 7883 (misidentified as *W. floribunda*).

Astragalus canadensis L. Extending down the James to Surry County: rich alluvial woods and thicket back of sand-beach of James River, Claremont Wharf, no. 8317; similar habitat, below Sunken Meadow Beach, no. 8318. See p. 383.

Desmodium pauciflorum (Nutt.) DC. Southampton County: alluvial woods, bottomland of Meherrin River, near Haley's Bridge, no. 8319. Sussex County: alluvial woods, upper terrace of Nottoway River, southwest of Burt, no. 7462. Surry County: dry woods northwest of Surry, no. 8726. Apparently general in alluvium.

D. tenuifolium T. & G. To the first Virginian station (in Isle of Wight County) add from Dinwiddie County: sphagnous bog about

1 mile northeast of Burgess, no. 7473. SUSSEX COUNTY: sphagnous depression just northwest of Wakefield, no. 8730. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8731.

*DESMODIUM CILIARE (Muhl.) DC., var. **lancifolium** Fernald & Schubert, var. nov. (TAB. 523), foliolis lanceolatis apice attenuatis, terminalibus 2–3.3 cm. longis ca. 1 cm. latis.—VIRGINIA: dry sand, pine barren about 7 miles south of Franklin, Southampton County, September 7 and 8, 1937, *Fernald & Long*, no. 7474 (TYPE in Gray Herb., ISOTYPE in Herb. Phil. Acad). See p. 366.

With the characteristic fruit of *Desmodium ciliare* (*D. obtusum* of authors), which has oval to round-ovate obtuse leaflets. As shown by Urban and subsequently by Blake (Bot. Gaz. lxxviii. 276) the type of *Hedysarum ciliare* Muhl. belongs to the species which has been passing as *Desmodium obtusum* (Muhl.) DC., while the type of *H. obtusum* Muhl. is not conspecific with it.

*LESPEDEZA CUNEATA G. Don. Roadsides and borders of woods, rather general. The following collections have been made: DINWIDDIE COUNTY: roadside gutter, border of swampy woods northwest of Carson, no. 7478. PRINCE GEORGE COUNTY: argillaceous roadside near Gary Church, no. 7479. SURRY COUNTY: roadside, Claremont Wharf, no. 8320.

Tall, erect annual from Asia, with white corolla, the standard with a blue-purple band. Originally introduced as a field-crop.

LESPEDEZA ACUTICARPA Mackenzie & Bush. To the station in Princess Anne County (first from Atlantic slope) reported by Fernald & Griscom, RHODORA, xxxvii. 167 (1935) add from NORTHAMPTON COUNTY: dry pine woods near Capeville, *F. L. & F.*, no. 5333.

*LESPEDEZA CAPITATA Michx., var. **hirtiformis,** var. nov. (TAB. 524), caule dense velutino; foliolis late elliptico-ovalibus vel obovatis utrinque sericeis.—VIRGINIA: border of dry woods, Zion's Church, northwest of Whaleyville, Nansemond County, September 17, 1937, *Fernald & Long*, no. 7481 (TYPE in Gray Herb., ISOTYPE in Herb. Phil. Acad.). PLATE 524, × 2/5. See p. 367.

Lespedeza capitata, with its short peduncles, densely capitate-spicate inflorescences and long calyx, throughout its broad range usually has narrowly oblong to narrowly lanceolate or linear leaflets. We have never before met it on the Coastal Plain of Virginia, except in the narrowest-leaved extreme, var. *longifolia* (DC.) T. & G. (with linear leaflets). Var. *hirtiformis* in its very broad rounded leaflets closely simulates *L. hirta* (L.) Hornem.; but its short peduncles, capitate spikes and large calyx place it clearly with *L. capitata*. The

colony near Whaleyville (a few miles west of the Great Dismal Swamp) is extensive.

*Stylosanthes riparia Kearney, var. **setifera**, var. nov., a forma typica recedit caulibus plus minusve hirsuto-setiferis, setis horizontaliter divergentibus 1–2 mm. longis; corollis lacteis.—Virginia: dry thicket by Ivor Road, east of Courtland, June 10, 1938, *Fernald & Long*, no. 8321 (type in Gray Herb.; isotypes in Herb. Phil. Acad. and elsewhere).

When we first detected this white-flowered plant, forming a colony adjacent to typical yellow- or orange-flowered *Stylosanthes riparia*, we took it to be an albino. Upon examining the specimens as they went into press it was found that their stems bore stiff setiform divergent hairs suggestive of the pubescence of *S. biflora* (L.) BSP., var. *hispidissima* (Michx.) Pollard & Ball. Accordingly, we returned to the station, expecting to find the yellow-flowered plant hispid. It proved to be perfectly typical, however, in having the stems only minutely pilose or puberulent; but all the white-flowered plants had hispid stems. The plant cannot, therefore, be treated merely as an albino.

A small colony of a true albino form of the species was found in July; this is

*S. riparia Kearney, forma **ochroleuca**, f. nov., a forma typica recedit petalis ochroleucis.—Virginia: a few plants among typical orange-flowered ones, dry border of woods about 1 mile north of Skipper's, Greensville County, July 15, 1938, *Fernald & Long*, no. 8732 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

Vicia caroliniana Walt. Apparently local on the Coastal Plain. Greensville County: dry rich woods near Metcalf Branch, east of Emporia, no. 7886. Southampton County: dry woods, thickets and clearings along Three Creek, Drewryville, no. 5813.

Lathyrus hirsutus L. To the first reported Virginian station (in Henrico County) add from Surry County: roadside thicket, Claremont Wharf, no. 8324.

Phaseolus polystachios (L.) BSP. Rare on the Coastal Plain. Prince George County: dry wooded slopes of gullies near Powell's Creek, Garysville, no. 8325. Southampton County: dry sandy open pine and oak woods 6 to 7 miles south of Franklin, nos. 8326, 8736. Dinwiddie County: borders of dry pine and oak woods, south of Burgess Station, no. 9080. See p. 380.

Very often *Phaseolus polystachios* has forking racemes or even panicles. Our material closely matches the Clayton specimen (type of the species) in having them quite simple.

Polygala Harperi Small. To the first Virginian stations (in Sussex County) add stations from three other counties. Nansemond County: damp sandy field north of Factory Hill, *F. & L.* in *Plantae Exsiccatae Grayanae* (not yet issued). Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 4336. Surry County: border of oak woods southwest of Surry, no. 8752.

*P. cruciata L., var. cuspidata Wood (Var. *ramosior* Nash; *P. cuspidata* Hook.; *P. ramosior* (Nash) Small). Sussex County: moist pinelands just southeast of Waverly, no. 7501. Southampton County: clearing in wet argillaceous pineland northeast of Courtland, no. 7503. Other collections transitional. See p. 366.

P. verticillata L., *sensu* Fernald in Rhodora, xl. 337, pl. 501 (1938). *P. Pretzii* Pennell. Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 8754. See p. 377.

In his study of the group Pennell (Bartonia, no. 13: 12–15 (1931)) cites the prevailingly inland *Polygala Pretzii* (true *P. verticillata* L., as shown in Rhodora, l. c.) from no Coastal Plain station south of New Jersey. Our plant is thoroughly typical, although it passes by free transitions into the next, which in turn passes into the newly described variety.

P. verticillata L., var. ambigua (Nutt.) Wood (*P. ambigua* Nutt.). Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, nos. 8333, 8755. Prince George County: dry sandy woods and clearings about 3 miles southeast of Petersburg, at head of Poo Run, no. 6650. Dinwiddie County: clearings and borders of pine and oak woods south of Burgess Station, no. 9086. See p. 377.

In his study of the group above referred to Pennell (p. 16) cites this commonly inland variety (as *P. ambigua* Nutt.) from no Coastal Plain stations south of New Jersey, its southeastern stations indicated as close to the Fall Line. Our three stations are on the Coastal Plain of southeastern Virginia. Several specimens in the Gray Herbarium, determined by Pennell as *P. ambigua*, from Missouri, Arkansas and Oklahoma, depart conspicuously from it in their very large white wings. Attention was called to this undescribed plant by our finding it also in Greensville County, Virginia. This is

*P. verticillata L., var. **dolichoptera**, var. nov. (tab. 525, fig. 1 et 2), var. *ambiguae* similis; floribus lacteis; alis ellipticis 2–2.6 mm. longis quam capsula valde longioribus.—Virginia, Missouri, Arkansas and Oklahoma. Virginia: peaty and argillaceous clearing about 4 miles southeast of Emporia, Greensville County, June 18, 1938, *Fernald & Long*, no. 8334 (type in Herb. Gray; isotypes in Herb.

Phil. Acad. and elsewhere), July 14, 1938, *Fernald & Long*, no. 8756, also in *Plantae Exsiccatae Grayanae* not yet issued. MISSOURI: Green County, July 23, 1897, *J. W. Blankinship;* woods, Eagle Rock, August 7, 1905, *Bush*, no. 3159; rocky woods, Noel, August 7, 1908, *Bush*, no. 5057. ARKANSAS: dry hills, southern Arkansas, *F. L. Harvey*, no. 101; dry and rocky floor of Maumel Mt., Pulaski County, October 16, 1931, *Delzie Demaree*, no. 8580; open woods, North Mt., Hot Springs, September 6, 1935, *F. J. Scully*, no. 266. OKLAHOMA: rocky creek-bank, Page, Laflore County, June 20, 1914, *O. W. Blakley* (*G. W. Stevens*, no. 1437). See p. 377.

Var. *dolichoptera* has the habit of *Polygala verticillata*, var. *ambigua* but its flowers (FIGS. 3 and 4) are much larger, var. *ambigua* having the wings only 1–1.5 mm. long and about equaling the capsule (FIG. 4). The bright- or milk-white flowers of var. *dolichoptera* are striking, though not wholly distinctive, for they show a tendency in age to change to pinkish. The plants are tall for any form of *P. verticillata*, the larger loosely bushy-branched plants of our no. 8756 being fully 4 dm. high.

STILLINGIA SYLVATICA L. SOUTHAMPTON COUNTY: dry open sandy pine and oak woods 6 to 7 miles south of Franklin, locally abundant, nos. 7508, 8337, 8338. See p. 380.

EUONYMUS ATROPURPUREUS Jacq. SURRY COUNTY: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8357. See p. 382.

*CELASTRUS ORBICULATUS Thunb. CAROLINE COUNTY: thoroughly naturalized in fence-row south of Milford, no. 7524. See p. 365.

An Asiatic species, becoming naturalized as far north as southeastern New York.

STAPHYLEA TRIFOLIA L. Extending locally into the Coastal Plain. SURRY COUNTY: rich wooded gullies along James River, below Sunken Meadow Beach, no. 8358 (trunks up to 7.5 m. high and 7 cm. in diameter). SUSSEX COUNTY: alluvial woods, Nottoway River, southwest of Lambs, no. 7525. GREENSVILLE COUNTY: rich deciduous woods along Three Creek, north of Emporia, no. 8359. See p. 382.

ACER FLORIDANUM Pax. GREENSVILLE COUNTY: abundant in rich deciduous woods by Metcalf Branch, east of Emporia, no. 8360. AMELIA COUNTY: alluvial woods along Deep Creek, about 1 mile southeast of Beaver Pond, no. 9096 (station shown us by Mr. John B. Lewis). See p. 380.

Small (Man.) says "Fla. to La. and S. C. Naturalized in N. C. Reported from Va." At our station it is the dominating tree in an extensive area of undisturbed (except for cutting) forest, with a striking group of local natives: *Scleria oligantha, Carex flaccosperma,*

Silene virginica, *Clematis ochroleuca*, *Rosa carolina* var. *glandulosa*, *Aesculus discolor*, *Phlox nivalis*, *Phacelia dubia* and *Coreopsis auriculata*, while the wooded bottomland close by supports an extensive area of isolated *Glyceria arkansana*. Sargent (Man. Trees, ed. 2) reports *Acer floridanum* from near McKenney, Dinwiddie County; and Mr. Lewis told us of a second station in Amelia County.

AESCULUS DISCOLOR Pursh. GREENSVILLE COUNTY: dry rich woods and bottomland-woods by Metcalf Branch, east of Emporia, nos. 7895, 7894. See p. 374.

These flowering specimens confirm the identification in RHODORA, xxxix. 352 and 435. The station was there erroneously given as Caney Branch (which crosses the Courtland road to the east of Metcalf Branch).

*VITIS CINEREA Engelm. GREENSVILLE COUNTY: alluvial woods, bottomland of Meherrin River, near Haley's Bridge, no. 8363. See p. 377.

Apparently the first on the Atlantic slope from north of Florida, although the rufescent var. *floridana* Munson (*V. Simpsoni* Munson; see RHODORA, xxxviii. 426), cited by Small only from Florida and by Bailey as extending north into Georgia, is abundant on practically all bottomlands.

V. VULPINA L. Following the James at least to SURRY COUNTY: rich alluvial woods and thicket back of sand-beach of James River, Claremont Wharf, no. 8361; seen also at Eastover. See p. 375.

TILIA MICHAUXII Nutt. SURRY COUNTY: rich woods on fossiliferous sandy slopes of gullies near Claremont Wharf, no. 7897; rich woods and thickets back of sand-beach of James River, Eastover, no. 8763. See p. 375.

A species of the interior, Sargent (Man. ed. 2) saying "southward . . . along the Appalachian Mountains." Leaves cordate-ovate, loosely pubescent beneath.

T. HETEROPHYLLA Vent. SURRY COUNTY: with the last, no. 8365. See p. 375.

Tall tree; leaves strongly oblique, permanently white-felted beneath. Also an upland tree, Sargent, l. c., giving the northeastern areas of its range: "White Sulphur Springs, Greenbrier County, West Virginia; Piedmont region of North and South Carolina and Georgia." The tree is not, however, new to Virginia. Several collections from the western half of the state are represented in the Gray Herbarium.

*Malva rotundifolia L., not of most American authors (*M. pusilla* With., *M. borealis* Wallm.). See C. V. Morton, Rhodora, xxxix. 99 (1937). Dinwiddie County: waste place, Petersburg, no. 8366.

Hypericum prolificum L. Surry County: rich woods and thicket back of the sand-beach of the James River, below Sunken Meadow Beach, no. 8368. Prince George County: locally very abundant in low open woods, Flowerdew Hundred, no. 8769, shrubs up to 2.5 m. high. Charles City County: alluvial woods by James river, Harrison Point, no. 9100. See p. 382.

An inland and upland species apparently not recorded from the Coastal Plain.

H. nudiflorum Michx. Reported, Rhodora, xxxvii. 432 (from Princess Anne County), as new to Virginia. Now known as a scattered shrub nearly to the Fall Line, in Nansemond, Sussex and Dinwiddie Counties (many nos.).

*H. adpressum Bart. Sussex County: border of a wooded swamp north of Stony Creek, nos. 8367, 8767.

First in the Gray Herbarium from between Delaware and North Carolina.

H. denticulatum Walt., var. ovalifolium (Britton) Blake. To the first Virginian station (in Sussex County), reported in Rhodora, xxxix. 337 and 435 add the following. Isle of Wight County: sandy and peaty border of Cat Pond, south of Benns Church, no. 7530. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7531. See p. 371.

H. setosum L. Sussex County: ditch bordering dry argillaceous pinelands about 4 miles northwest of Waverly, no. 7532; moist pinelands just southeast of Waverly, no. 7533, abundant. Greensville County: peaty openings bordering wooded swamp north of Skipper's, no. 9101. See p. 366.

Viola affinis LeConte, var. chalcosperma (Brainerd) Griscom. To the first Virginian record (from Southampton County) should be added one from Nansemond County: alluvial wooded bottomland of Somerton Creek, Factory Hill, no. 8371.

*V. Langloisii Greene, var. pedatiloba Brainerd. Southampton County: dry wooded slopes by Three Creek, Drewryville, no. 7908. See p. 375.

Seemingly quite like the original material from Louisiana.

V. esculenta Ell. To the one reported Virginian station (in Norfolk County) add one in Greensville County: rich woods by Three Creek, 2 miles north of Emporia, no. 7990. See p. 375.

*V. emarginata (Nutt.) LeConte, var. acutiloba Brainerd. Sussex County: dry pine woods east of Burt, no. 7541, quite like

the original material from the District of Columbia. JAMES CITY COUNTY: damp clearing in rich woods south of Hotwater, no. 8780.

V. LANCEOLATA L. SUSSEX COUNTY: sandy woods near Mars Hill Church, no. 7898.

Apparently rare on the Inner Coastal Plain, though common in eastern Princess Anne County and on the Eastern Shore. Grimes did not find it on the Peninsula of Virginia.

V. LANCEOLATA, var. VITTATA (Greene) Weath. & Grisc. To the first Virginian station (in Sussex County) reported add one from ISLE OF WIGHT COUNTY: sandy and peaty border of Cat Pond, south of Benns Church, no. 7543.

VIOLA KITAIBELIANA Roem. & Schultes, var. **Rafinesquii** (Greene), comb. nov. *V. bicolor* Pursh, Fl. Am. Sept. i. 175 (1814), not Gilibert (1781). *V. tenella* Muhl. Cat. 26 (1813) *nomen subnudum;* Eaton, Man. ed. 2: 496 (1818); Raf. in Am. Mo. Mag. iv. 191 (1819); not Poir. (1810). *V. Rafinesquii* Greene, Pittonia, iv. 9 (1899). PLATE 526, FIGS. 1, 2, 4 and 7.

Viola Rafinesquii is the one American representative of the prevailingly Eurasian and north African pansies which has been sometimes considered indigenous with us. Its behavior, however, is so decidedly that of early-established weeds of European, north African or Asiatic origin that its claims to being indigenous in the eastern United States seem no better than those of other weedy species, like *Poa compressa, Allium vineale, Arenaria serpyllifolia, Ranunculus bulbosus, Duchesnea indica, Potentilla argentea, Vicia angustifolia, Rhamnus cathartica, Hypericum perforatum, Ligustrum vulgare, Thymus Serpyllum, Solanum Dulcamara, Linaria vulgaris, Veronica arvensis* and *serpyllifolia, Lonicera japonica, Artemisia vulgaris, Cirsium lanceolatum,* and hundreds of others brought to us from abroad and now thoroughly at home in fields, recent clearings, pastures, open second- to fourth-growth woods near farms, or other altered habitats where they associate with and often crowd out the strictly indigenous plants.

The first record of the American plant was, apparently, by Gronovius, based upon Clayton's collection, in 1739: his "VIOLA caulibus & pedunculis quadratis, stipulis oblongis pinnato-dentatis, foliis ovato-oblongis crenatis. Flore est penitus albo. *Clayt.* n. 527," the identity established by Asa Gray who noted opposite the description in 1839 "*tenella* Pursh" (of course meaning *V. tenella* Muhl. as validated by Eaton, or *V. bicolor* Pursh which was separately named *V. tenella* by Rafinesque in 1819). *V. Rafinesquii* was, then, in Virginia

two centuries ago. It is now a ubiquitous weed especially of roadsides, or in lawns, worn-out fields, pastures and pastured woodlands in many areas from New Jersey and eastern Pennsylvania to Georgia; also occasional to common from Connecticut to Nebraska, south to the Gulf States. If in the 18th century it was as common as today and if it be indigenous through its present extensive area in the Atlantic States, it is most singular that Pehr Kalm, arriving in Philadelphia in 1748 and exploring from that center in the spring of 1749 should not have noted it; that Walter, dating the preface to his *Flora Caroliniana* "ad Ripas Fluvii Santee, 30 Dec. 1787," should not have got it; that Elliott, publishing the section including *Viola* in 1817, should have had it from no station in South Carolina and from only a single station in Georgia, whence it was sent to him.[1] Darby, covering the "Southern States" in different editions from 1841 to 1860, apparently knew of *Viola Rafinesquii* (as *V. arvensis*) only through Elliott's single station for the plant. In 1860, in the first edition of his *Flora of the Southern States*, Chapman, under *V. tricolor*, var. *arvensis*, said "Cultivated ground. Introduced" and he repeated this treatment in the second edition (1883); but in his third edition (1897) he changed to "Open woods and waste places, perhaps indigenous." Many other records from literature could be quoted, all of the same character, indicating that the pretty lavender-flowered "Field Pansy" of eastern North America was not much known to the acute observers of the 18th and the first decades of the 19th century, but that now it is often a ubiquitous weed over large areas. I have noted from the labels of collections of *V. Rafinesquii* in the Gray Herbarium the habitats recorded. 39 numbers have no habitat given. The remainder are as follows: "native," 1; dry open woods, 8; dry sandy hill (or slope), 4; rocky hill (or summit), 3; open rocky soil, 2; bank of creek, 1; meadows, 5; dry fields, 14; clearings, 3; old orchard, 1; pasture, 3; cultivated field, 2; railroad embankment, 2; roadside, 11; waste places, 11. Pursh's *V. bicolor* (1814) came from "fields of Pennsylvania and Virginia." If the plant were indigenous we should expect the overwhelming majority of habitats to be undisturbed or primitive ones and that the species would now be rarer than it was two centuries (or only one century) ago. The majority of habitats are,

[1] Elliott placed his specimen under *Viola arvensis*, defined with "calyx pubescent, rather longer than the corolla"; but he added "*Calyx* ciliate, in my specimens shorter than the corolla . . . My specimens agree exactly with one sent me from Pennsylvania by Dr. Muhlenberg."

however, spots cleared by the white man or the negro or disturbed by him, his cattle or his hogs. Mixed in the herbarium with specimens of the *Viola* are often found *Veronica arvensis* or *Stenophragma Thaliana;* and the label of W. Becker's VIOLAE EXSICCATAE, II Lief. 1901, no. 48, of *V. Rafinesquii* is quite typical: "**Flora Americ. boreal**: *Brookland D. C.;* locis graminosis, ad vias, in pratis, frequens. . . . *Begleitpflanzen:* Lamium amplexicaule, Veronica peregrina, Lithospermum arvense, Poa pratensis etc."

It would be a pleasant thought, and by several enthusiastic Americans it has been urged, that we have an indigenous pansy in America. Phytogeographically, however, the pansy-group belongs in a region (chiefly continental and southern Europe and adjacent northern Africa and western Asia) with which the indigenous flora of the temperate eastern United States has little in common. The pansies are native, however, in an area which has supplied many of our long-established and still just arriving weeds. Consequently, my first introduction in the field to *Viola Rafinesquii,* an aggressive weed, monopolizing the uninviting band of thin soil between the rails of the trolley-tracks and the worn-out waste fields and neglected lawns about Richmond, Virginia, coupled with Mr. Long's assurance that in his experience it always looks like a weed, quite upset the impression gained from our manuals of recent years, that the plant is native. In similar habitats in the southeastern states we get the Mediterranean *Alchemilla microcarpa* Boiss. & Reut., which has been mistaken by Rydberg for an endemic American and called *Aphanes australis* Rydb. in N. Am. Fl. xxii. 380 (1908).[1]

Our *Viola Rafinesquii* (FIGS. 1, 2, 4 and 7) strongly suggests in the outlines of its leaves and stipules the southern European *V. Kitaibeliana* Roem. & Schultes (FIGS. 3, 5, 6 and 8) but its leaf-blades are more commonly entire and its lilac- or lavender-tinged petals (FIG.1) are larger than in any specimens of the latter (FIG. 5) in the Gray Herbarium. Knowing that I should get an authoritative identification by sending some Virginian specimens to the distinguished student of the Iberian flora, Mr. A. J. Wilmott of the British Museum, I ventured to put my problem before him. Wilmott's answer follows:

As soon as I saw your specimens of *Viola Rafinesquii* I said to myself that surely they were *Viola Kitaibeliana* Schultes, which is a common ally of *Viola arvensis* Murr. in the Mediterranean region. It differs from *V.*

[1] See discussion on previous page.

arvensis in several characters, notably the short pubescence in the lower part of the plant (stem), the longer narrower terminal lobe of the stipule, the shorter stumpier spur. Usually, however, it has very small flowers, the petals being scarcely or not longer than the sepals, whereas in your specimens they are definitely larger. I find, however, that among the mass of specimens that we received from Macedonia during the war, there are quite a number of specimens that have the petals as large as in your plant. Yours also has the long peduncles, and, to judge from a gathering from Maryland by Blake, which is the only one in the herbarium, they stand out 45 degrees or more from the stem when fruiting, giving a "diverging" effect unlike that usual in *V. arvensis*.

The chief objection to this determination lies in the strongly ciliate margin to the sepals in *V. Rafinesquii* as illustrated by the specimens you sent. Blake's are slightly less markedly so, but even so they are more ciliate than in any of our specimens of *V. Kitaibeliana*. On the other hand, although most sepals in our material of *V. Kitaibeliana* have no ciliate hairs, or very minute and inconspicuous ones, on the margins of the sepals, some (including one of the gatherings with large flowers) has the margins almost as densely puberulous as those of *V. Rafinesquii* are ciliate, and also in some sepals the short hairs are replaced by ciliae just as long as in *V. Rafinesquii*.

The foliage is quite good for *V. Kitaibeliana*, as is also the habit. There is, indeed, almost nothing wrong with that determination except that I cannot exactly match it among our material. Yet one knows that *V. arvensis* is so variable, with many forms, and also *V. Kitaibeliana* is very variable, although the different forms have not been thoroughly worked out if they exist, that I feel that if we had a larger series from all parts, we should be able to find specimens just like *V. Rafinesquii*, and thus possibly find from what part of Europe (or North Africa) it was imported. Those from Macedonia and the Southern Caucasus seem to have the strongest ciliation to the sepals, and also the more frequently larger flowers. I find no other species which it could be from Europe if it is not a form of *V. Kitaibeliana*.

Is the ciliation constant in your plant?

The ciliation (FIG. 4) is essentially constant in the American series. I am unable to find in our series any specimens with so few cilia on the sepals as in the most ciliate calyces (FIG. 8) of the European plant. With Wilmott's prediction in mind, that somewhere in the Mediterranean region exact matches for our plant must be found and considering his statement that quite as large petals sometimes occur in Europe, it seems probable that a rare but unrecognized extreme was early brought from southern Europe or northern Africa and that in a new environment it has become quite stabilized. If this interpretation is correct, then *Viola Kitaibeliana*, var. *Rafinesquii*, rapidly spreading and aggressive in eastern America but rare (in this case perhaps unknown) in Europe takes its place with several other weeds which with us have become vastly more common than they are in the country of their origin.

Hybanthus concolor (Forster) Spreng. Surry County: rich woods on fossiliferous sandy slopes of gullies, Claremont Wharf, nos. 7916, 8374. See pp. 375, 382.

An inland type.

Dirca palustris L. Surry County: rich woods, slopes of gully 1½ miles north of Surry, no. 8375, the dominant shrub under *Fagus*, reaching a height of 3 m. and trunk-diameter of 7 cm. See p. 383.

In the single extensive area, slopes of a gully tributary to Gray's Creek, the shrub is very abundant. We had seen it nowhere else on the Coastal Plain, nor did Grimes find it on the Peninsula of Virginia.

Rhexia mariana L., var. purpurea Michx. Range extended inland to Dinwiddie County: sphagnous bog about 1 mile northeast of Burgess, no. 7546.

Ludwigia sphaerocarpa Ell., var. jungens Fernald & Griscom in Rhodora, xxxvii. 174, t. 348, figs. 3 and 4 (1935). To the type-station at Cape Henry add several new records. Isle of Wight County: sandy and peaty border of Cat Pond, south of Benns Church, no. 7547. Nansemond County: canal in Great Dismal Swamp, east of Laurel, no. 8791. Sussex County: swampy clearing north of Stony Creek, no. 8790. Greensville County: pool in *Cephalanthus* swamp about 1 mile north of Skipper's, no. 8788. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7548. See p. 371.

L. brevipes (Long) E. H. Eames. Isle of Wight County: sphagnous border of Cat Pond, south of Benns Church, no. 8376.

Extension inland from Norfolk County.

Proserpinaca pectinata Lam. Greensville County: pool in cut-over sphagnous pine and oak woods near Three Creek, north of Emporia, no. 8379. York County: borders of small pond-holes in woods, northwest of Grafton, no. 7552. Warwick County: shallow pool in woods, north of Lee Hall, no. 8795. See p. 371.

Aralia racemosa L. Surry County: rich calcareous wooded gullies along James River, Claremont Wharf, nos. 8380, 9112 (3 m. high!). See p. 382.

Found in a similar habitat near Williamsburg by Grimes.

Eryngium yuccifolium Michx. Sussex County: dry open sandy pine and oak thickets, near the Greensville County line, south of Jarratt, nos. 8385, 9387. Prince George County: border of woods north of Talpa, no. 8801. See p. 379.

In regard to the unjustified use of the name *Eryngium aquaticum* for this upland species see Britten & Baker, Journ. Bot. xxxviii. 243 (1900). The species is cited as occurring northward to Connecticut; but in Cat. Fl. Pl. Ferns of Conn. is the note "Introduced from the

South, or possibly native." Except for this presumably adventive colony in a sandy field at Bridgeport, Connecticut ("sparingly naturalized"), Coulter & Rose cite nothing in the East from north of the interior of Virginia.

*Sanicula marilandica L., var. **petiolulata**, var. nov. (tab. 527), foliolis foliorum 1–2 imorum caulinorum longe petiolulatis, petiolulis 1.5–5 cm. longis.—Virginia: dry sand, pine barrens about 7 miles south of Franklin, Southampton County, September 7 and 8, 1937, *Fernald & Long*, no. 7553 (type in Gray Herb., isotypes in Herb. Phil. Acad. and elsewhere). See p. 366.

Typical *Sanicula marilandica* has the leaflets of the lower (as well as the upper) leaves all sessile or on very short petiolules (rarely up to 1.5 cm. long). The plant in the pine barrens south of Franklin has all the petiolules of the 1 or 2 lower leaves with extraordinarily long foot-stalks. The habitat is likewise extraordinary for any form of the species (ordinarily of damp and rich habitats). The type-colony is under *Quercus laevis* Walt. and *Viburnum rufidulum* Raf.; and close by are characteristic colonies of such pine-barren species as *Aristida virgata* Trin., *Tradescantia rosea*, var. *graminea* (Small) Anders. & Woodson, *Myrica pusilla* Raf., *Asimina parviflora* (Michx.) Dunal, *Stillingia sylvatica* L., *Euphorbia Ipecacuanhae* L., *Opuntia humifusa* Raf., *Phlox nivalis* Lodd., *Carphephorus bellidifolius* Michx. and other species of dry pineland which we ordinarily do not associate with *Sanicula marilandica*.

S. gregaria Bicknell. Frequent in rich woods eastward at least to Surry, Sussex and Nansemond Counties (many nos.). See p. 382.

*S. Smallii Bicknell. Hanover County: rich woods north of Gum Tree, no. 7554. Southampton County: rich deciduous woods, northeast of Statesville, nos. 7917, 8384. See pp. 365, 378.

Extension north from North Carolina.

Chaerophyllum Tainturieri Hook. Greensville County: weed in freight-yard, Emporia, no. 7920.

C. procumbens (L.) Crantz. Extending locally into the Coastal Plain in Surry County: by brook in drained cypress swamp, Claremont Wharf, no. 7921.

Osmorhiza longistylis (Torr.) DC., var. villicaulis Fern. Surry County: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8386; similar habitat below Sunken Meadow Beach, no. 8387. See p. 383.

The plant with glabrous stems not seen.

Cryptotaenia canadensis (L.) DC. In rich deciduous (chiefly

calcareous) woods eastward to Sussex and Surry Counties (many nos.). See p. 382.

Thaspium barbinode (Michx.) Nutt. Surry County: rich wooded slope at head of Sunken Meadow Creek, south of Claremont, nos. 7922, 8390; seen in similar habitat at Eastover. Sussex County: moist woods bordering Assamoosick Swamp, about 2 miles northeast of Homeville, no. 9114. See pp. 375, 382.

Oxypolis rigidior (L.) Coult. & Rose. Localized in sphagnous boggy depressions of Dinwiddie, Prince George, Sussex and Greensville Counties (many nos.), and doubtless elsewhere. See p. 367.

In southeastern Virginia *Oxypolis rigidior* is often the quickly visible indicator of a good habitat. Three of its stations have proved to be among the best of sphagnous depressions, with many localized Coastal Plain types present.

Rhododendron nudiflorum (L.) Torr., var. glanduliferum (Porter) Rehder. Southampton County: bottomland swamp of Nottoway River, Smith's Ferry, no. 7928.

Very rare on the Coastal Plain, Rehder in his *Azaleas of North America*, 138 (1921) saying: "from Massachusetts to northwestern South Carolina and often grows together with the typical form. It seems, however, nearly absent from the southeastern part of the range, that is from the coastal plain from New Jersey to North Carolina and more common West, for the plants I have seen from the extreme Western localities, western Tennessee and southern Ohio, represent this variety though from the last named locality (Lawrence County) and from western New York (Monroe County) I have seen specimens of the typical form."

Kalmia angustifolia L., var. caroliniana (Small) Fernald. Nansemond County: low pinelands east of Whaleyville, no. 7564.

The known Virginian stations have all been in the Great Dismal Swamp.

Epigaea repens L. Very local on the Coastal Plain. Prince George, Isle of Wight, Surry and Southampton Counties: local colonies too liable to extermination.

Hottonia inflata Ell. To the few recorded stations add Southampton County: inundated swamp west of Adams Grove, no. 7944. Surry County: shallow water of gum swamp, Blackwater River, south of Savedge, no. 8405.

Lysimachia ciliata L. Rich deciduous or bottomland woods, eastward to James City, Surry and Sussex Counties (many nos.).

Fraxinus americana L. Extending eastward along the James to

SURRY COUNTY: below Sunken Meadow Beach, no. 8414. See pp. 375, 382.

F. BILTMOREANA Beadle. DINWIDDIE COUNTY: swampy woods, Poplar Grove (= Poplar Spring) Church, no. 8413. SOUTHAMPTON COUNTY: sphagnous wooded spring-heads east of Emporia, no. 8415. See p. 380.

FRAXINUS TOMENTOSA Michx. f. Hist. Arb. Am. iii. 112, t. 9 (1813). *F. Americana profunda* Bush in Mo. Bot. Gard. Fifth Ann. Rep. 147 (1894). *F. profunda* Bush in Britton, Man. 725 (1901). *F. Michauxii* Britton, Man. ed. 2: 1075 (1905). *F. profunda*, var. *Ashei* E. J. Palmer in Journ. Arn. Arb. xiii. 417 (1932). PLATE 528.

Originally treated as a variation (category not indicated) of *Fraxinus americana*, from which it differs "in the strong pubescence of the shoots, the large size of the leaves, and the very large fruit, the shaft of which is often strongly six-sided," *F. profunda* was further defined in Britton's Manual by its being placed with *F. pennsylvanica* Marsh. and by its larger samara with more decurrent wing. The material distributed by Bush shows that the long-acuminate subcoriaceous leaflets are on definite wingless petiolules (FIG. 3); the samaras (FIG. 4) without sharply defined slender bodies, the mature fruits 4–7.5 cm. long, with wing 6–12 mm. broad; the fruiting calyx rather large for the group. Exactly such trees, though often lower, are abundant along the rivers and in the wooded swamps of eastern Virginia, the specimens identified variously as *F. pennsylvanica* and *F. profunda*, with note sometimes made of the lustrous upper surfaces of the subcoriaceous leaflets. In this tree the petiolules (FIG. 5) are quite as definite as those of *F. americana* but mostly longer (0.5–2 cm. long). In the polymorphous *F. pennsylvanica* (PLATE 529) the petiolules are bordered nearly to their bases by the decurrent tissue of the blades and the fruits have clearly defined slenderly clavate bodies sharply contrasted with the wings which extend only narrowly below the middle.

True *Fraxinus pennsylvanica* Marsh. I take to be the common tree (PLATE 529, FIGS. 3 and 4) of Marshall's region in Pennsylvania, defined by him as having the fruits ("seeds") "longer and narrower than any of the other kinds, almost terminating in a point at their base," for which reason, presumably, he called it "*Pennsylvanian Sharp-keyed Ash.*" The tree, abundantly represented from Marshall's region, was described as *F. Darlingtoniana* Britton, l. c. 725 (1901). It occurs from the warmer valleys of New England to Minnesota,

south to Georgia, Alabama and Arkansas, but the only material of it which I have seen from southeastern Virginia is Grimes's no. 3880 from near Williamsburg.

The broader-fruited *Fraxinus profunda*, on the other hand, is represented in the Gray Herbarium by the following Virginia collections: Chickahominy River, near Lanexa, *Grimes*, no. 4126; James River, near Richmond, April 24, 1915, *J. R. Churchill* (in fine staminate flower, showing the subulate tips of the anthers 0.5–1 mm. long, whereas the mucronate tips in *F. pennsylvanica* are only 0.2–0.4 mm. long); swampy woods, London Bridge, Princess Anne County, *Fernald & Long*, no. 4128; Indian Creek, Norfolk County, *Fernald, Griscom & Long*, no. 4690; Appomattox River, near Hopewell, *Fernald, Long & Smart*, no. 5890; Three Creek, Drewryville, *Fernald, Long & Smart*, no. 5891 (FIGS. 5 and 6). Palmer includes in his *F. profunda*, var. *Ashei* specimens from the Potomac Valley and from the Eastern Shore of Maryland, and it may reach southern New York.[1]

The tree is so characteristic of the river-swamps and dismals in southeastern Virginia that it seemed improbable that it should have been overlooked by Michaux and other early collectors who went through the region. André Michaux and his son Francois André, it now seems clear, got it and the younger Michaux described and beautifully illustrated it, his plate showing the wholly characteristic foliage with slender petiolules and the quite distinct fruit. *F. tomentosa* came from "la Pensylvanie, le Maryland et la Virginie" and the illustration (see our FIGS. 1 and 2), presumably from the common tree

[1] I take it that *Fraxinus tomentosa* Michx. fil. also includes *F. Michauxii* Britton, Man. ed. 2: 1075 (1905). Britton's description is satisfactory for it and he originally stated that his *F. Michauxii* (type from southeastern New York) is "*F. tomentosa* Michx. f. Arb. For. **3:** *pl. 9*, but not as to the description there given, which applies to *F. Pennsylvanica.*" In view of the very confused ideas regarding what constitute stable characters in the group it is disconcerting to be told that, when Michaux filius illustrated his own new species, he was really illustrating something else. The matter was not really clarified when in his North American Trees, 804 (1908) Britton said of his *F. Michauxii* "The species was illustrated by Michaux as *Fraxinus tomentosa* Marshall." I can find no such name used by Marshall and Michaux (André) did not publish it nor illustrate it; it was first published by Michaux filius (Francois André) and has by everyone, except Britton in this instance, been ascribed to him. Even *F. epiptera* Michx. Fl. Bor.-Am. ii. 256 (1803), commonly treated as identical with *F. americana* L., is open to question. My memorandum made in 1903, when examining Michaux's herbarium, says "Foliage of *F. pennsylvanica.*" A photograph of it, daily expected, will settle its identity. One thing seems reasonably settled. The Clayton specimen (a photograph before me) which Linnaeus had before him in preparing his Species Plantarum (1753) and himself marked "*americana*" is a characteristic leaf of *F. americana* as regularly understood. From that one Linnean species on the types of the American species must be studied anew.

of river-swamps of southeastern Virginia, is perfect. Incidentally, *Fraxinus tomentosa* Michx. f. "croît, de préférence, dans les marais, ainsi que dans tous les endroits fréquemment submergé, ou qui sont exposés à l'être par les fortes pluies. . . . se trouve réuni avec les arbres qui, comme lui, aiment les terreins fort humides, tel que le *Juglans squamosa*, le *Juglans amara*, le *Quercus discolor*, l'*Acer rubrum*, le *Liquidambar styraciflua* et la *Nyssa aquatica*." That *F. profunda* Bush (1901), at least as to its eastern phase, is *F. tomentosa* Michx. f. (1813) is unquestionable. Whether it is also *F. pubescens* Lam. (1786) I can more easily tell when a photograph of Lamarck's type reaches me from Paris. It may also prove to be one of the full dozen species of North American *Fraxinus* proposed by Bosc in 1808, chiefly from the southeastern states: *F. rufa*, *F. fusca*, *F. longifolia*, *F. rubicunda*, etc. By an easy wave of the hand, demoting, without examining the types, most of the species proposed by Lamarck, Bosc, Michaux filius and others of 100 to 150 years ago, to the unquestioned synonymy of a few species of Linnaeus, Miller and Marshall, the way was cleared for new propositions of recent date. Until the types of all the early-proposed species have been most intelligently checked the names of our American ashes will remain hopelessly tentative. Had the names been given to Chinese trees their applications would long ago have been settled by American students of woody plants!

FRAXINUS PENNSYLVANICA Marsh., var. **Austini**, var. nov. (TAB. 529, FIG. 1 et 2), ramulis petiolis rhachibusque velutinis; foliolis plerumque dentatis subtus plus minusve rufidulo-pubescentibus; fructibus 2.8–3.7 (rare–4) cm. longis, corpore 1–1.7 cm. longo, ala spathulata 4–8 mm. lata.—Quebec to Manitoba, south to Nova Scotia, New England, northern New Jersey to upland of Virginia, New York, Ohio, Illinois and Iowa. TYPE: bank of St. John River, Ingleside, Westfield, Kings County, New Brunswick, August 6, 1909, *Fernald*, no. 2069.

As I see the species, *Fraxinus pennsylvanica* Marshall consists of three rather pronounced varieties. As already explained (p. 450), I take as var. *typica* the tree which abounds in the region best known to Marshall, the extreme with pubescent young branchlets, petioles and leaf-rachises and with fulvous pubescence on the lower surfaces of the commonly entire leaflets; the fruits the longest in the species, with elongate and slender body and narrow wings (FIGS. 3 and 4). This tree is common southward, from Alabama to Louisiana, extending northward to central Maine, the Connecticut Valley of New Hamp-

shire and Vermont, the Champlain Valley of Vermont, central New York, southern Ontario, Michigan, Wisconsin and Minnesota. Var. *Austini*, which was sent to Asa Gray as an undescribed variety by the late Coe F. Austin (1831–1880), from Closter, New Jersey, is generally more northern. Var. *lanceolata* (Borkh.) Sargent, with branchlets, petioles and usually the serrate leaflets glabrous, is wide-ranging. *F. campestris* Britton, No. Am. Trees, 799, fig. 726 (1908), with "young twigs . . . either smooth or velvety" and toothed leaflets "more or less hairy beneath, rarely smooth on both surfaces", seems to me to be *F. pennsylvanica,* var. *lanceolata* passing into var. *Austini.*

My arrangement of the varieties of *Fraxinus pennsylvanica* follows:

Young branchlets velvety-tomentose; petioles, leaf-rachises and lower surfaces of leaves more or less fulvous-pubescent.

Mature samaras 4–7.5 cm. long, the body (covering seed) 1.7–3 cm. long, the linear-oblanceolate wing 3–6 (rarely –7.5) mm. broad; leaflets usually entire or merely undulate, rarely dentate.....Var. *typica.*

Mature samaras 2.8–3.7 (rarely –4) cm. long, the body 1–1.7 cm. long, the spatulate wing 4–8 mm. broad; leaflets commonly toothed.....Var. *Austini.*

Young branchlets, petioles and leaf-rachises glabrous; leaflets toothed, green and glabrous or at most with pale villosity on the principal nerves beneath; mature samaras 2.7–4.5 cm. long, their bodies 1–2 cm. long, the spatulate or oblanceolate wings 4–6 mm. broad.....Var. *lanceolata.*

F. pennsylvanica Marsh., var. **typica.** *F. pennsylvanica* Marsh. Arbust. Am. 51 (1785). *F. Darlingtoniana* Britton, Man. 725 (1901) and No. Am. Trees, 802, fig. 730 (1908).—Alabama to Louisiana, north to warm valleys of New England, New York, southern Ontario, Michigan, Wisconsin and Minnesota. Plate 529, figs. 3 and 4.

Var. Austini. See above.

Var. lanceolata (Borkh.) Sargent, Sylva, vi. 50 (1894). *F. lanceolata* Borkh. Handb. Forst. Bot. i. 826 (1800).—Quebec to Saskatchewan and Montana, south to Virginia, Alabama, Arkansas, Oklahoma and Texas.

As already sufficiently emphasized many names, both specific and varietal, may belong to these three varieties. Until their bases are most painstakingly checked their application cannot safely be guessed at. Too much guessing in the past has created a confusion altogether not creditable. Under var. *lanceolata,* for instance, Sargent, in making the combination, cited three earlier varietal names which have to be considered. Any one of them, if belonging here, would upset the combination *F. pennsylvanica,* var. *lanceolata* (Borkh.) Sargent.

In southeastern Virginia FRAXINUS PENNSYLVANICA follows the James at least to SURRY COUNTY: Claremont Wharf, no. 8412.

OBOLARIA VIRGINICA L. To the few recorded stations add the following. ISLE OF WIGHT COUNTY: rich deciduous woods north of Walters, no. 7145. SURRY COUNTY: rich wooded slope at head of Sunken Meadow Creek, south of Claremont, no. 7951. GLOUCESTER COUNTY: rich wooded bank, near Gloucester, *E. J. Palmer*, no. 39,773. See pp. 364, 375.

ASCLEPIAS PURPURASCENS L. Rare on the Coastal Plain. NANSEMOND COUNTY: roadside thicket west of Cypress Chapel, no. 7579.

*ACERATES FLORIDANA (Lam.) Hitchc. SUSSEX COUNTY: border of peaty and argillaceous swale, north of Littleton, no. 8422. See p. 378.

The first in the Gray Herbarium from north of South Carolina; known from a single station in Delaware.

*IPOMOEA LACUNOSA L., forma **purpurata**, forma nov., corollis purpureis.—VIRGINIA: grassy roadside about 7 miles south of Franklin, Southampton County, September 8, 1937, *Fernald & Long*, no. 7580; wet thicket bordering Whiteoak Swamp, south of Elko Station, Henrico County, September 21, 1938, no. 9409.

A form with the flowers consistently claret-purple instead of the usual milk-white.

PHLOX NIVALIS Lodd. SOUTHAMPTON COUNTY: dry sand, pine barrens 6 to 7 miles south of Franklin, nos. 7146, 7583, 7952. GREENSVILLE COUNTY: border of dry rich woods near Metcalf Branch, east of Emporia, no. 7953. See pp. 364, 366.

At the latter station broadening of the road has reduced what presumably was a good colony to about 6 struggling survivors.

P. CAROLINA L., var. TRIFLORA (Michx.) Wherry. DINWIDDIE COUNTY: border of swampy woods, Poplar Grove (= Poplar Spring) Church, no. 8432; border of swampy woods east of Burgess, no. 8433. See p. 381.

The stations, discovered by *Meade Lewis*, who took us to them, are rather extensive. The plants are the narrow-leaved extreme but they have calyx-lobes mostly 7–9 mm. long, this agreeing with var. *triflora* which Wherry, Bartonia, no. 13:32 and 36, treats as a plant of the upland of North Carolina, Virginia and Maryland, thence to southern Indiana. Our stations are on the inner margin of the Coastal Plain.

NEMOPHILA MICROCALYX (Nutt.) Fisch. & Meyer. SURRY COUNTY: rich woods on fossiliferous sandy slopes of gullies near Claremont Wharf, no. 7954. See p. 375.

The old specimen from Virginia, in the Gray Herbarium, is of vague origin.

PHACELIA DUBIA (L.) Trel. Our only Coastal Plain station in GREENSVILLE COUNTY: bottomland woods by Metcalf Branch, east of Emporia, no. 7955. See p. 374.

*MYOSOTIS VERSICOLOR (Pers.) Sm. DINWIDDIE COUNTY: in and about a newly seeded clover-field southwest of Petersburg, no. 7956.

*VERBENA BRASILIENSIS Vellozo. WARWICK COUNTY: fields and roadsides, Morrison, no. 7585. See p. 371.

A tropical species, recorded by Dr. Perry, *Revis. N. Am. Sp. Verbena*, Ann. Mo. Bot. Gard. xx. 255 (1933), northward to Wilmington, North Carolina.

V. URTICIFOLIA L. The coarse, typical form of the species, local on the Coastal Plain. YORK COUNTY: border of salt marsh northwest of Yorktown, no. 7586.

TEUCRIUM CANADENSE L., var. VIRGINICUM (L.) Eaton. See Fernald, RHODORA, XXXV. 395 (1933). Extending down the James to SURRY COUNTY: rich alluvial woods and thicket back of sand-beach of James River, Claremont Wharf, no. 8435. See p. 382.

TRICHOSTEMA DICHOTOMUM L., var. PUBERULUM Fernald & Griscom in RHODORA, XXXIX. 445 (1937). To the single Virginian station (in Norfolk County) reported add one from SOUTHAMPTON COUNTY: dry sand, pine barrens about 7 miles south of Franklin, no. 7591. See p. 366.

SCUTELLARIA VERSICOLOR Nutt. Extending locally eastward to SURRY COUNTY: rich calcareous wooded gullies by James River, Claremont Wharf, no. 8436; rich alluvial woods and thicket back of sand-beach of James River, below Sunken Meadow Beach, no. 8437. See pp. 382, 383.

*SCUTELLARIA INTEGRIFOLIA L., forma **rhodantha,** f. nov., corollis roseatis.—Damp thicket by roadside, west of Sussex Court House, VIRGINIA, June 9, 1938, *Fernald & Long*, no. 8440 (TYPE in Gray Herb., ISOTYPE in Herb. Phil. Acad.).

An unusually attractive color-form, making a conspicuous display, with flowers in color suggesting *Physostegia*.

AGASTACHE NEPETOIDES (L.) Ktze. Locally eastward to SURRY COUNTY: rich alluvial woods and thicket back of sand-beach of James River, below Sunken Meadow Beach, no. 8443. See p. 382.

PHYSOSTEGIA DENTICULATA (Ait.) Britton. Eastward to NANSEMOND COUNTY: wooded bottomland of Somerton Creek, Factory Hill, no. 8444.

STACHYS NUTTALLII Shuttlew. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, below Sunken Meadow Beach, no. 8446. See p. 382.

COLLINSONIA CANADENSIS L. Eastward to SUFFOLK COUNTY: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8449; seen in similar habitat at Eastover. See p. 382.

*PHYSALIS MONTICOLA C. Mohr. SOUTHAMPTON COUNTY: dry sandy open pine and oak woods 6 to 7 miles south of Franklin, nos. 8452, 8905.

First except from the mountains of Alabama. See p. 380.

SCROPHULARIA LANCEOLATA Pursh. SUSSEX COUNTY: rich wooded slope, 4 miles south of Stony Creek, no. 8454. See p. 381.

Extension into the edge of the Coastal Plain; Pennell (Scroph. E. Temp. N. Am. 278–280) noting stations only in the upland districts.

PEDICULARIS CANADENSIS L. Locally eastward to NANSEMOND COUNTY.

SCHWALBEA AMERICANA L. To the stations already noted add the following. SUSSEX COUNTY: dry open sandy pine and oak thickets, near the Greensville County line, south of Jarratt, no. 8461. GREENSVILLE COUNTY: similar habitat, near the Sussex County line, north of Emporia, no. 8462. Really one area, situated in two counties. See pp. 378, 379.

UTRICULARIA GEMINISCAPA Benj. Inland to DINWIDDIE COUNTY: peaty spring-fed pond, Century House, northeast of Burgess, no. 7612.

CONOPHOLIS AMERICANA (L. f.) Wallr. SURRY COUNTY: rich wooded gullies along James River, below Sunken Meadow Beach, no. 8464; seen also at Eastover. See p. 382.

*PLANTAGO VIRGINICA L., var. **viridescens**, var. nov. (TAB. 530, FIG. 4–6), foliis oblanceolatis 0.5–10 cm. longis 0.2–2 cm. latis repando-dentatis vel integris supra glabris vel sparse hirsutis glabratisque; pedunculis 1–12 cm. longis piloso-hispidis, pilis 0.2–0.5 mm. longis; spicis 0.3–13 cm. longis; sepalis 1.5–2.3 mm. longis; corollae lobis 1–2.5 mm. longis; seminibus 1.2–1.5 mm. longis.—Maryland to Florida, west, locally, to Texas. MARYLAND: border of pasture-meadow, about 1 mile southeast of Rock Springs, Cecil County, May 3, 1925, *Long*, no. 32,312; field, Owing's Mills, Baltimore, May 3, 1910, *J. R. Churchill*. VIRGINIA: dry fields, campus of University of Richmond, Westhampton, April 24, 1935, *Alice Ryland;* argillaceous and siliceous cotton field south of Littleton, April 4, 1938, *Fernald & Long*, no. 7964; sandy roadside-bank near Hart's Bridge, southwest of Sunbeam, April 4, 1938, *Fernald & Long*, no. 7965 (transitional); bare sand near Walters, April 6, 1938, *Fernald & Long*, no. 7966 (TYPE in Gray Herb; ISOTYPE in Herb. Phil. Acad.). NORTH CAROLINA: hard clayey soil by roadside, 5 miles south of New Bern, April 15, 1932, *Weatherby*, no. 6089. SOUTH CAROLINA: dry pine woods south of Myrtle Beach, April 8, 1932, *Weatherby & Griscom*, no. 16,642; loose sand, roadside, 1 mile north of Georgetown Landing, April 20, 1932, *Griscom & Weatherby*, no. 16,640; sandy soil by ditches, Sum-

merville, April 11, 1912, *Robinson*, no. 130. GEORGIA: old specimen without further data (Herb. *Geo. Thurber*); Augusta, *Olney & Metcalf*, no. 253. FLORIDA: weed in cultivated ground, Duval County, April 2, 1902, *Fredholm*, no. 5019; sandy soil, Eustis, April 1–15, 1894, *Nash*, no. 344; waste ground, Hillsborough County, March 5, 1904, *Fredholm*, no. 6305; Apalachicola, April, 1875, *A. Gray;* Hibernia, March, 1869, *Canby*. TEXAS: Houston, March 23, 1900, *Canby*, no. 206.

In southeastern Virginia, in early April, 1938, var. *viridescens* was in full anthesis and, at the type station, in fruit, whereas typical and ubiquitous *Plantago virginica* was not yet flowering (see p. 373), though on the 9th the first flowers were coming out. Not only the early flowering, the small flowers (FIGS. 4 and 6) and the green, soon glabrate leaves strongly contrast with typical *P. virginica*. The leaves are consistently narrow, their pubescence (FIG. 5) short, and the pubescence of the peduncle (FIG. 6) short and relatively stiff. Typical *P. virginica* varies in size, of course, but it is usually much larger than var. *viridescens*. It has a grayish-green tone on account of the villous young leaves and peduncle, whence a colloquial name, "Hoary Plantain." Its leaves (FIG. 1) are narrowly obovate and rather permanently villous, the hairs (FIG. 2) much longer than in var. *viridescens*. Its peduncles are copiously villous with flexuous hairs (FIG. 3) 1–2 mm. long (except in starved individuals); its sepals are 2–2.5 mm. long, corolla-lobes (FIG. 3) 2–3 mm. long and seeds 1.6–2 mm. long.

It is possible that var. *viridescens* may have been described by Rafinesque as a species. I have been unable to derive clear satisfaction from his diagnoses; and for a variety the present name is appropriate and rests on cited specimens. In his recent treatment of *Plantago virginica* Pilger recognizes[1] only two varieties: var. *longifolia* Gray, which is all really *P. rhodosperma* Deene., as shown by the sheets labeled by Gray; and var. *progressa* Pilger, a very densely villous extreme from Mexico. *P. purpurascens* Nutt., as shown by his material at the Academy of Natural Sciences of Philadelphia, is typical *P. virginica*.

P. HETEROPHYLLA Nutt. Local weed of cultivated fields. SOUTHAMPTON COUNTY: north of Sebrell, no. 7968. GREENSVILLE COUNTY: 1 mile south of Emporia, no. 7154. See pp. 364, 372, 373.

GALIUM UNIFLORUM Michx. Range extended to the Peninsula of Virginia and, later, to the Gloucester Peninsula. YORK COUNTY: dry open woods northwest of Tabb's, no. 7619. GLOUCESTER COUNTY: rich mixed woods east of Gloucester, no. 8857. See p. 371.

[1] Pilger in Engler, Pflanzenr. iv[280]. 213, 214 (1937).

Diodia teres Walt., var. hystricina Fernald & Griscom. Range extended westward to York County: sandy beach of York River, northwest of Yorktown, no. 7620. See p. 372.

Cephalanthus occidentalis L., var. pubescens Raf. Prince George County: swampy woods, bottomland of Powell's Creek, Garysville, no. 8477. Greensville County: shallow pond-hole in woods, just north of Dahlia, no. 8858.

Houstonia patens Ell. Extending into the inner border of the Coastal Plain. Greensville County: dry rich woods, about 1 mile west of Emporia, no. 7970. Southampton County: sandy roadside bank near Hart's Bridge, no. 7969.

H. longifolia Gaertn. Locally along the James to Surry County: rich wooded gullies below Sunken Meadow Beach, no. 8482. See p. 382.

Oldenlandia Boscii (DC.) Chapm. To the first Virginian station, already reported add, also in Southampton County: wet siliceous and argillaceous drained border of Predler's Pond, Nottoway Swamp, southwest of Sedley, no. 7625; border of peaty pool in cypress-gum swamp, about 4 miles northwest of Capron, no. 7626. See p. 369.

Viburnum acerifolium L. Surry County: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8484. See p. 382.

Our only Coastal Plain station.

Eupatorium fistulosum Barratt acc. to Wiegand & Weatherby in Rhodora, xxxix. 306 (*E. purpureum* and *E. trifoliatum* sensu Wiegand in Rhodora, xxii. 161, not L.). Sussex County: alluvial woods, Coppahaunk Swamp, about 3 miles southeast of Waverly, no. 7637.

Cited by Wiegand, l. c. only from the region of the Blue Ridge in Virginia.

E. purpureum L., acc. to Wiegand & Weatherby, l. c. (*E. trifoliatum* L.; *E. falcatum* Michx.). Surry County: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, no. 8488; seen also at Eastover. Nansemond County: rich deciduous wooded slope, South Quay, no. 8489. See p. 382.

The freshly dried plant has a strong fragrance of vanilla.

Carphephorus bellidifolius (Michx.) T. & G. To the first Virginian stations (in Isle of Wight County), already recorded, add one in Southampton County: dry sand, pine barrens about 7 miles south of Franklin, no. 7659. Nansemond County: dry woods east of South Quay, no. 9173. Greensville County: pine woods west of Skipper's, no. 8870. See p. 366.

Plant glutinous, staining the papers yellow.

C. tomentosus (Michx.) T. & G. To the only known Virginian station (in Isle of Wight County) add the following. Southampton County: clearing in wet argillaceous pineland northeast of Courtland,

no. 7655. NANSEMOND COUNTY: low pinelands east of Whaleyville, nos. 7656, 7657 (7.5 dm. high, with about 40 heads in larger plants); sandy roadside thicket bordering pine woods, south of Piney Grove School, northwest of Whaleyville, no. 7658, very abundant and handsome, with corymbs up to 2 dm. across. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, nos. 8869, 9172. See pp. 367, 370.

LIATRIS SPICATA (L.) Willd. SUSSEX COUNTY: moist pinelands just southeast of Waverly, no. 7660, very abundant.

As pointed out on p. 366, *Liatris spicata* in Virginia and the Carolinas is chiefly montane.

(*To be continued*)

NOTEWORTHY PLANTS OF SOUTHEASTERN VIRGINIA

M. L. Fernald

(*Continued from page 459*)

*Chrysopsis **Longii**, sp. nov. (tab. 531, fig. 1–4), planta *C. gossypinam* simulans valde sericeo-lanata, villis albidis; caulibus 1–10 4.5–7.5 dm. altis basi decumbentibus supra ramosis ramis divergentibus vel adscendentibus; foliis basilaribus rosulatis oblanceolatis 3–7 cm. longis 0.5–1.7 cm. latis; foliis caulinis numerosis, imis anguste obovatis vel oblongo-oblanceolatis 3–6 cm. longis 1–2.3 cm. latis, foliis mediis superioribusque oblongis leviter reductis, foliis ramorum similibus minoribus subremotis; involucro late hemispherico-campanulato 1–1.5 cm. alto valde albido-lanato; bracteis 5–6-seriatis lineari-lanceolatis apice attenuatis, apicibus deinde squarrosis; ligulis 25–30, 1–1.3 cm. longis; disci floribus numerosis (100–200), 6–8 mm. longis, fauce lobisque longe villosis; achaeniis oblanceolatis stipitatis 2.8–3.4 mm. longis 0.8–1.2 mm. latis dense sericeo-strigosis, pilis albidis; pappo ochroleuco 6–8 mm. longo.—Southampton County, Virginia: dry sand, pine barrens about 7 miles south of Franklin, September 7 and 8, 1937, *Fernald & Long*, no. 7664 (type in Gray Herb., isotype in Herb. Phil. Acad.), October 12, 1937, *Braxton Townsend*, no. 7725 (topotype, distributed to many herbaria); sandy thickets and open woods near Blackwater River, north of Smith's Ferry, back of Bailey's Seine Beach, July 19, 1938, *Fernald & Long*, no. 8874; dry sandy old clearing, north of Smith's Ferry, Nottoway River, *Fernald & Long*, no. 8875.

Chrysopsis Longii is apparently the plant which has passed as *C. gossypina* (Michx.) Nutt. in southeastern Virginia (see p. 366). I have seen no earlier-collected material identified as *C. gossypina* and Small (Man.) doubts the extension northward into Virginia of that species (*C. pilosa* (Walt.) Britton). However, our original station for it is

in the dry sandy pine barren through which the old and now abandoned road southward toward Murfreesboro, North Carolina, used to run; in fact, the plant abounds and spreads[1] in the loose sand of the abandoned roadway. In 1867 the late Wm. M. Canby collected near Franklin *Baptisia villosa* (Walt.) Ell. and many other highly localized species (now in the Gray Herbarium) and he, as well as others before and after him, could hardly have missed so conspicuous a plant as *Chrysopsis Longii*.

Although so strongly resembling *Chrysopsis gossypina* that, upon discovering it, we took if for that more southern species, *C. Longii* differs from the plant occurring from southeastern North Carolina to Florida in several characters. In habit and foliage it is very similar but its leaves are relatively large. The involucre of *C. gossypina* (FIG. 5) has the bracts shorter, narrower, less inclined to be squarrose at tip and with the slender tips more implicated in wool; the broader and longer bracts of *C. Longii* (FIG. 2) soon become squarrose and their tips are mostly free or less inmeshed. The most fundamental characters, however, are in the disk-corollas and the mature achenes. The disk-corollas of *C. gossypina* (FIG. 6) are glabrous at summit, those of *C. Longii* (FIG. 3) have long villi or sparse beard at the throat and on the lobes. The ripe achenes of *C. gossypina* (FIG. 7) are cuneate-obovate, 2 mm. long and with a prominent blunt and smoothish rib down the middle of each of the sparsely pilose faces. The ripe achenes (FIG. 4) of *C. Longii* are narrower and longer (2.8–3.4 mm. long), copiously silky-strigose and with a very slender and obscure pilose midrib on each face.

A word should be said regarding the correct name of *Chrysopsis gossypina*. The species was first published as *Erigeron pilosum* Walt. Fl. Carol. 206 (1788). It was next described from "maritimis Carolinae et Floridae" as *Inula gossypina* Michx. Fl. Bor.-Am. ii. 122 (1803). In 1818 the species was transferred to *Chrysopsis* as *C. gossypina* (Michx.) Nutt. Gen. ii. 150 (1818), the correct name for the plant. In 1832 Nuttall described the well-known species of the interior of the United States as *C. pilosa* Nutt. Journ. Acad. Phila. vii. 66 (1834). But Britton, following the now discarded American Code, renamed *C. pilosa* Nutt. (1834) *C. Nuttallii* Britton in Mem. Torr. Bot. Cl. v. 316 (1894) because of the earlier *Erigeron pilosum*

[1] In July, 1938, the white-lanate plant was found to spread so vigorously in sandy clearings that I jocosely dubbed it "LONG'S FLANNELWEED."

Walt. (1788); and he published the equally superfluous combination *C. pilosa* (Walt.) Britton, l. c. (1894) not Nutt. (1834) for the plant which is correctly *C. gossypina* (Michx.) Nutt.

SOLIDAGO ARGUTA Ait. Reaching the Coastal Plain in SUSSEX COUNTY: alluvial woods, terraces of Nottoway River, southwest of Burt and southwest of Lamb's, nos. 7666, 7667. GREENSVILLE COUNTY: rich woods by Fontaine Creek, west of Dahlia, noted but not collected. SURRY COUNTY: calcareous wooded slope by James River, Cobham Wharf, no. 9462. See p. 366.

*SOLIDAGO **perlonga**, sp. nov. (TAB. 532, FIG. 1–4), planta *S. austrinam* simulans; caule glabro plus minusve purpureo-maculato 0.9–1.5 m. alto; foliis subcoriaceis glaberrimis margine scabro exceptis conspicue punctatis, basilaribus laminis late oblanceolatis vel anguste ovato-lanceolatis acutis vel subacutis 0.7–2.5 dm. longis 1.5–8 cm. latis serratis vel crenatis basi attenuatis, costa dorso acute angulata, reticulo conspicuo, petiolis vix alatis eciliatis laminam aequantibus vel superantibus, foliis caulinis valde reductis imis elongatis mediis superioribusque lanceolatis integris vel subintegris acutis, reticulo conspicuo; inflorescentia valde elongata, anguste cylindrica interrupta 2–6.5 dm. alta simplici 2–5 cm. diametro ramulis secundis perbrevibus apice floriferis, vel ramosis ramis erectis vel adscendentibus valde elongatis; pedicellis glabris bracteolatis ad 1 cm. longis; involucris campanulatis 5.5–6.5 mm. longis; bracteis chartaceis 4–5-seriatis, exterioribus lanceolato-subulatis, interioribus oblongo-linearibus obtusis stramineis dorso viridibus; disci floribus 12, tubo 1–1.5 mm. longo, fauce 2–2.5 mm. longo, lobis 1 mm. longis; ligulis 5–7, 1.7–2 mm. latis; achaeniis maturis 1.4–1.8 mm. longis albido-strigosis; pappo maturo 4 mm. longo.—Southeastern VIRGINIA: wet woods, Westhampton, Henrico County, in young flower, September 9, 1937, *Fernald & Long*, nos. 7668 and 7669, in fruit October 13, 1937, *R. F. Smart;* clearing in wet argillaceous pineland northeast of Courtland, Southampton County, in young flower, September 11, 1937, *Fernald & Long*, no. 7670 (TYPE in Gray Herb., ISOTYPES in Herbs. Phil. Acad., Univ. Richmond and elsewhere); border of exsiccated argillaceous woods south of Brandon, Prince George County, August 16, 1938, *Fernald & Long*, nos. 9180–9183; border of field, west of Burrowsville, Prince George County, September 17, 1938, *Fernald & Long*, no. 9463; exsiccated swampy woods about 1 mile southwest of Branchville, Southampton County, August 19, 1938, *Fernald & Long*, no. 9184; exsiccated argillaceous pineland about 2 miles east of Stony Creek, Sussex County, August 24, 1938, *Fernald & Long*, no. 9185, also October 11 and 12, 1938, no. 9640. See p. 370.

Solidago perlonga, very striking on account of its slender and elongate inflorescence, simulates *S. austrina* Small, *S. flavovirens* Chapm. and *S. yadkinensis* (Porter) Small. Its quite glabrous in-

florescence, its elongating rhizomes and the slender eciliate petioles of its basal leaves quickly distinguish it from the last species. In its rhizome, eciliate petioles and glabrous inflorescence it is close to the two former and clearly belongs in the series designated by Mackenzie in Small's Manual the *Uliginosae*.[1] From *S. flavovirens* of the Apalachicola marshes it is at once separated by its slender petioles, mostly serrate lower blades and broad blunt involucral bracts. In general *S. perlonga* is nearest related to *S. austrina*. It is coarser throughout, except for the smaller achenes. Its conspicuously veiny leaves (FIG. 2) with greenish rather acutely angled midrib contrast with the minutely and inconspicuously reticulate leaves (FIG. 5) and the whitish wire-like midrib of *S. austrina*. In the latter the basal leaves have blades 0.7–1.5 dm. long and only 1–2.5 cm. broad; in the newly proposed species they are much larger (1–2.5 dm. long and up to 8 cm. broad). In *S. austrina* the involucre (FIG. 6) is 4–5 mm., in *S. perlonga* (FIG. 3) 5.5–6.5 mm. high and with broader bracts. The ligules of *S. austrina* are 1–1.5 mm., those of *S. perlonga* 1.7–2 mm. broad. The mature achenes of *S. austrina* (FIG. 7), as shown in the type collection, are 3–3.6.5 mm. long, those of the coarser *S. perlonga* (FIG. 4) are only 1.4–1.8 mm. long. In southeastern Virginia, where *S. perlonga* occurs in wet woods and peaty clearings, it was just beginning to flower on September 9th,[2] and mature material has been supplied by Dr. Smart, collected on October 13th. The type of *S. austrina*, in fully mature fruit, was collected September 11th and several sheets are before me in full anthesis collected in North Carolina in mid-August. In general species of *Solidago* flower earlier in the North than southward. It is probable that *S. perlonga* is a later-flowering plant than its nearest ally. As the type[3] of *S. perlonga* I have designated the plant of Southampton County, although we have a more diverse series from the Westhampton station. The latter colony, unfortunately, is in the midst of a rapidly changing suburban development and is destined soon to be destroyed. The type-station is in wild and, except for cutting of timber, undisturbed pineland between Courtland and Sedley.

[1] In his definition of the series Mackenzie explicitly says "blades . . . not pellucid-punctate." This, however, was an unfortunate statement, for in the herbarium-material of *S. flavovirens*, *S. austrina* and *S. perlonga* the pellucid dots are very definitely shown by holding the specimens in front of an ordinary desk-lamp.

[2] In 1938, *S. perlonga*, seen frequently in swampy or exsiccated borders of woods, began flowering in mid-August but was in its prime in mid-September.

[3] The TYPE was designated and isotypes distributed to other herbaria before the discovery in 1938 of several more extensive colonies.

S. GRAMINIFOLIA (L.) Salisb., var. POLYCEPHALA Fern. Inland to DINWIDDIE COUNTY: sphagnous boggy margin of spring-fed pond, Century House, northeast of Burgess, nos. 7674, 7675. See p. 368.

ERIGERON PULCHELLUS Michx. Eastward in rich woods and clearings to SURRY COUNTY.

E. PHILADELPHICUS L. SURRY COUNTY: calcareous meadow near head of Sunken Meadow Creek, south of Claremont, no. 7977.

Our only other Coastal Plain station is on Cedar Island in Back Bay, Princess Anne County.

E. VERNUS (L.) T. & G. Extended inland from the coast of Princess Anne County to western NANSEMOND COUNTY: springy thicket bordering ditch, north of Factory Hill, no. 8491. See p. 379.

*ANTENNARIA FALLAX Greene, var. CALOPHYLLA (Greene) Fernald (*A. ampla* Bush). DINWIDDIE COUNTY: dry sandy pine woods southeast of Burgess, no. 7691. PRINCE GEORGE COUNTY: dry woods northeast of Talpa, no. 8889.

First north of North Carolina.

*A. MUNDA Fernald in RHODORA, XXXVIII. 229, t. 433 (1936). SURRY COUNTY: knoll at border of dry beech woods in gully 1½ miles north of Surry, no. 8493. See p. 383.

Extension south from northeastern Pennsylvania.[1] Inadequate specimens from the mountains of North Carolina may belong here.

A. SOLITARIA Rydb. Occasional on rich wooded slopes eastward to SURRY COUNTY: east of Cabin Point, no. 7979; and noted as far east as Sunken Meadow Beach and Surry. YORK COUNTY: dry open woods northwest of Tabb's, no. 7693. See pp. 371, 375.

GNAPHALIUM OBTUSIFOLIUM L., var. MICRADENIUM Weatherby. Local range extended westward. SUSSEX COUNTY: dry pine woods east of Burt, no. 7698. SOUTHAMPTON COUNTY: rich woods southeast of Ivor, no. 7697. DINWIDDIE COUNTY: border of dry pine woods about 1 mile northeast of Burgess, no. 7696. GREENSVILLE COUNTY: dry pine and oak woods about 1 mile north of Skipper's, no. 8890; similar habitat, within a few yards of the North Carolina line, southeast of Spring Church (2½ miles southwest of Dahlia), no. 8891. See p. 369.

G. OBTUSIFOLIUM, var. PRAECOX Fernald in RHODORA, XXXVIII. 231, t. 434, figs. 1–3 (1936). Local range extended northward into HENRICO COUNTY: damp thicket, Solomon's Store, no. 7694.

G. CALVICEPS Fernald. Originally described from small plants (1–2.5 dm. high) from the region of Cape Henry, the species proves to be weedy and abundant on roadsides and in fallow fields westward

[1] It is well here to report the extension into North Carolina of ANTENNARIA PARLINII Fernald, var. ARNOGLOSSA (Greene) Fernald: argillaceous roadside-bank about 2 miles east of Spring Hope, Nash County, April 7, 1938, *Fernald & Long*, no. 7978.

into Dinwiddie, Sussex and Southampton Counties; in these disturbed ("cultivated") soils luxuriant, freely branched and up to 5.25 dm. high (many nos.).

Silphium atropurpureum Retz. To the two Virginian stations (one each in Wythe County and in Princess Anne County) recorded by Dr. Perry in Rhodora, xxxix. 290 (1937) add two in Surry County: calcareous, fossiliferous bushy slope near head of Sunken Meadow Creek, south of Claremont, no. 8498; dry woods northwest of Surry, no. 8894; and one in Greensville County: rich deciduous woods by Three Creek, north of Emporia, no. 9198. See p. 382.

S. compositum Michx., var. reniforme (Raf.) T. & G. To the only Virginian station (in Bath County) cited by Perry, l. c. 295 (1937) add one in Dinwiddie County: dry pine woods about 1 mile northeast of Burgess, no. 7700. See p. 369.

Chrysogonum virginianum L. Extending eastward at least to Prince George County (sandy wooded slopes along Powell's Creek, Garysville, no. 7980), Dinwiddie County (border of swampy woods, east of Burgess, no. 8499) and Greensville County (dry rich woods near Metcalf Branch, east of Emporia, no. 7981). See p. 375.

Heliopsis helianthoides (L.) Sweet. The typical large-headed plant, extending locally eastward to Surry County: rich calcareous woods near head of Sunken Meadow Creek, south of Claremont, nos. 8501, 9203. See p. 382.

Rudbeckia hirta L., var. monticola (Small) Fernald in Rhodora, xxxix. 457, 458 (1937). Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 8503. James City County: rich woods south of Williamsburg, no. 8895.

A montane plant; here apparently isolated.

R. hirta L., var. Brittonii (Small) Fernald, l. c. Greensville County: with the last, no. 8504.

Also a montane type; here apparently isolated.

Actinomeris alternifolia (L.) DC. Eastward at least to Sussex County: rich woods, Moore's Mill, no. 7709; alluvial woods, Nottoway River, southwest of Lambs, no. 7710; and Surry County: rich calcareous wooded gullies along James River, Claremont Wharf, no. 9211.

*Coreopsis **oniscicarpa**, sp. nov. (tab. 533, tab. 534, fig. 1, 5 et 8), herba perennis glabra pallida 6–9 dm. alta erecta; caulibus subteretibus simplicibus supra corymboso-ramosis; foliis oppositis rariter alternis integris, basilaribus anguste oblanceolatis longe petiolatis laminis 3.5–7 cm. longis 0.5–1 cm. latis marginibus callosis, superioribus valde reductis bracteiformibus brevissimis; capitulis paniculato-corymbosis tenuiter pedunculatis pedunculis ad 1 dm. longis; involucri bracteis glabris, exterioribus 7–11 irregulariter biseriatis coriaceis

lanceolatis 0.7–3 mm. longis, bracteis interioribus oblongis 6 mm. longis 2–3 mm. latis; floribus ligulatis ca. 8, ligulis aurantiaco-flavis cuneato-obovatis 0.8–1.6 cm. longis apice 3-lobatis lobo medio rotundato 1.5–3.5 mm. longis; paleis linearibus acutis 3.5–5 mm. longis; disci floribus corollis atropurpureis 2–3 mm. longis; achaeniis planis olivaceis plus minusve fimbriato-pectinatis, corpore 1.8–2.2 mm. longis 0.6–0.9 mm. latis faciebus plerumque valde papillatis, apice bi(rariter tri)-aristatis aristis 0.7–1.3 mm. longis antrorse setulosis.—VIRGINIA: ditches bordering sandy woods, Factory Hill, Nansemond County, August 26, 1936, *Fernald & Long*, no. 6728; wet thickets and ditches bordering sandy woods, Factory Hill, October 17, 1936, *Fernald & Long*, no. 6906 (TYPE in Gray Herb.); clearing in wet argillaceous pineland northeast of Courtland, Southampton County, September 11, 1937, *Fernald & Long*, no. 7712. Nos. 6728 and 6906 and some material of no. 7712 distributed as *C. gladiata* Walt.[1] See pp. 370, 379.

[1] Since the above account went into type *Coreopsis oniscicarpa* has been collected at several additional stations in southeastern Virginia and it has been found by my student, Mr. Robert K. Godfrey, to extend across eastern North Carolina from the boundary of Virginia to the boundary of South Carolina. It doubtless occurs in the latter state; and the scattered stations in southeastern Virginia are evidently northern outposts of a species primarily of North Carolina. The following are the additional stations:

VIRGINIA: seeping bank of ditch at margin of woods, about 2 miles southeast of Cleopus, Nansemond County, August 21, 1938, *Fernald & Long*, no. 9213; damp pineland north of Dahlia, Greensville County, October 12, 1938, *Fernald & Long*, no. 9653; edge of springy ditch bordering pine woods, east of South Quay, Nansemond County, October 13, 1938, *Fernald & Long*, no. 9654; springy roadside bank north of Factory Hill, Nansemond County, October 13, 1938, *Fernald & Long*, no. 9655 (topotype); peaty openings bordering wooded swamp along Mill Creek, about 1 mile north of Skipper's, Greensville County, October 14, 1938, *Fernald & Long*, no. 9657. NORTH CAROLINA: border of moist argillaceous pine and oak woods 1½ miles northeast of Dort School, Gates County, October 13, 1938, *Fernald & Long*, no. 9656; open pineland, Middlesex, Nash County, July 21, 1938, *R. K. Godfrey*, no. 5422; same station, October 9, 1938, *Godfrey & Kerr*, no. 6632; savannah, Edward, Beaufort County, October 11, 1938, *Godfrey & White*, no. 6887; pineland, Ft. Barnwell, Craven County, October 11, 1938, *Godfrey & White*, no. 6840; pineland, Grantsboro, Craven County, October 11, 1938, *Godfrey & White*, no. 6815; open pineland, Delway, Sampson County, August 25, 1938, *Godfrey*, no. 6164; savannah 8 miles southwest of Jacksonville, Onslaw County, September 1, 1938, *Godfrey*, no. 6464; savannah 5 miles east of Jacksonville, August 6, 1938, *Godfrey*, no. 5805; savannah 5 miles west of Richland, Duplin County, August 6, 1938, *Godfrey*, no. 5882; savannah, Burgaw, Pender County, August 7, 1938, *Godfrey*, no. 5921; margin between sandhill and peaty pineland, 8 miles south of Aberdeen, Scotland County, October 12, 1938, *Godfrey*, no. 6954; open pineland, Hallsboro, Columbus County, August 6, 1938, *Godfrey*, no. 6250; open pineland 7 miles southwest of Wilmington, Brunswick County, August 28, 1938, *Godfrey*, no. 6207.

Mr. Godfrey calls my attention to the habital similarity (in narrow basal and opposite cauline leaves) of *Coreopsis oniscicarpa* to *C. linifolia* Nutt. That more southern species, as shown by specimens in the Gray Herbarium so named by Sherff, has the outer involucral bracts ovate and rounded at summit (2–3 mm. broad, the lanceolate or lance-deltoid and tapering outer bracts of *C. oniscicarpa* only 0.6–1.3 mm. broad), the inner bracts 3.5–5 mm. broad (in *C. oniscicarpa* 2–3), and the glabrous faced achenes 3–3.5 mm. long (the strongly papillate, though finally glabrate, achenes of *C. oniscicarpa* only 1.8–2.2 mm. long). The type of *C. linifolia*, as also of *C. callosa* Bertol., referred by Sherff to it, came from Alabama and Sherff cites specimens only from Florida, Alabama and Mississippi, although there are specimens in the Gray Herbarium, labeled by him *C. linifolia*, from southeastern South Carolina, Georgia and Texas. Sherff's statement of range is "North Carolina to Florida, thence west-

The original material collected at Factory Hill was in bud and was referred tentatively to *C. gladiata*, this misidentification carelessly perpetuated in labeling later collections. However, as defined by Sherff in his *Revision of the Genus Coreopsis*,[1] which came out subsequent to our discovering the Virginia plant, *C. gladiata* has the basal leaves elliptic-oblong or oblanceolate, with blades 1–2.5 cm. broad; cauline leaves alternate; outer involucral bracts up to 6 mm. long, the inner 8–12 mm. long (our FIG. 2); and essentially glabrous black achenes 3.2–3.5 mm. long (our FIG. 10). *C. oniscicarpa* (from *Oniscus*, the sowbugs, etc.) in its narrow leaves is as near *C. longifolia* Small (FIGS. 3, 6 and 9) and *C. falcata* Boynton (FIGS. 4, 7 and 11). The contrasts between the three may be expressed in tabular form. They are also displayed in PLATE 534.

	C. LONGIFOLIA	C. FALCATA	C. ONISCICARPA
Leaves	Alternate	Alternate	Mostly opposite
Outer involucral bracts	Thin, 2–5 mm. long	Thin, 4–7 mm. long	Firm, 1–3 mm. long
Inner involucral bracts	6-12 mm. long, acutish	8–10 mm. long, acutish	6 mm. long, obtuse
Ligules	1.5–2.5 cm. long	1.3–2.3 cm. long	0.8–1.6 cm. long
Disc-corollas	3.5–4.5 mm. long	3.5–4 mm. long	2–3 mm. long
Pales	1 cm. long	6 mm. long	3.5–5 mm. long
Achenes	3.5–4.3 mm. long, the fringe much shorter than the breadth (1.1–1.6 mm.) of achene, faces glabrous	3.5–4.5 mm. long, the fringe as long as the breadth (0.8–1.2 mm.) of the achene, faces glabrous	1.8–2.2 mm. long, the fringe much shorter than the breadth (0.5–0.8 mm.) of the achene, faces copiously papillate

Coreopsis oniscicarpa is, then, completely segregated from its more southern allies by its usually opposite leaves, its smaller involucres, ligules and disk-corollas, and by the tiny achenes with papillate surfaces and with relatively long awns. Near Factory Hill, the type station, it is only about 3 miles (across Blackwater River) from the

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wardly to Alabama and Mississippi." The reputed occurrence in North Carolina of *C. linifolia* has no support in Sherff's citation of specimens; and Mr. Godfrey, who spent a long season exploring eastern North Carolina, bringing back to the Gray Herbarium 3500 series of vascular plants, got *C. oniscicarpa* southward practically to the South Carolina line and found *C. falcata* in abundance but saw no *C. linifolia*. It is probable that the unexplained report of *C. linifolia* as extending northward to North Carolina originated with material of *C. oniscicarpa*.

[1] Field Mus. Nat. Hist. Bot. Ser. xi. no. 6 (1936).

type station of *Chrysopsis Longii*, *Desmodium ciliare* var. *lancifolium* and *Sanicula marilandica* var. *petiolulata*. It is there only a few miles from the type station of *Lespedeza capitata* var. *hirtiformis*, while its area northeast of Courtland (no. 7712) is the type station for *Solidago perlonga*.

*C. LANCEOLATA L., var. VILLOSA Michx. HENRICO COUNTY: scattered in dry woods (exact locality not stated), May, 1933, *S. B. Kovacs* (sent from University of Richmond to the Gray Herbarium as *C. pubescens*).

Not cited by Sherff, Revis. Gen. Coreopsis, 344 (1936) from Virginia.

*C. GRANDIFLORA Hogg. PRINCESS ANNE COUNTY: border of pine woods near Creeds, *F. & G.*, no. 4515. Escape from cultivation generally.

Although Sherff, l. c. 353, gives the mystifying range "Missouri and Kansas southward to Florida," etc., he cites material from Georgia; however, he notes none on the Atlantic slope from north of there. Our material, though young, seems inseparable from the plant of Little Stone Mountain, cited by Sherff.

*COREOPSIS **heterogyna**, sp. nov. (TAB. 335, FIG. 1–9), planta perennis; caulibus valde corrugatis arcuato-adscendentibus 9 dm. altis basi pilosis; foliis caulinis primariis 6-jugis late oblanceolatis acutis longe petiolatis, petiolis 0.5–1 dm. longis, laminis 9–13 cm. longis 2–3.5 cm. latis utrinque pilosis; foliis superioribus subpetiolatis; pedunculis 1–2.5 dm. longis; involucri bracteis exterioribus 9 firmis deltoideo-lanceolatis 7–9 mm. longis mox reflexis margine albido-hyalinis; bracteis interioribus ovatis 1.5–1.7 cm. longis 0.7–1 cm. latis; ligulis plerumque 8 flavis cuneato-obovatis 2 cm. longis apice 3-lobatis; floribus tubulosis aurantiacis; paleis lineari-attenuatis deinde 1–1.2 cm. longis; achaeniis diversis, minoribus (sterilibus vel substerilibus) cuneato-oblongis subplanis corpore 3–3.5 mm. longo 0.7–1.5 mm. lato utrinque laevi alis albidis 0.3–0.5 mm. latis, majoribus late obovatis vel reniformibus valde concavis corpore 3.5–4 mm. longo 2–2.5 mm. lato dorso laevi vel plus minusve verrucoso-muriculato ventre (valde concavo-excavato) plus minusve aristato-muriculato alis brunneis 1–1.5 mm. latis.—VIRGINIA: rich alluvial woods and thickets back of sand-beach of James River, below Sunken Meadow Beach, Surry County, June 14, 1938, *Fernald & Long*, no. 8506 (TYPE in Herb. Gray, ISOTYPE in Herb. Phil. Acad). See p. 383.

It is doubtless bold to propose another species in *Coreopsis*, § *Eucoreopsis;* but of the temperate North American species I can find

none with achenes like the large central ones[1] of *C. heterogyna*. The newly proposed species is obviously a member of the series including *C. lanceolata* L., *C. corninsularis* Sherff, *C. debilis* Sherff, *C. intermedia* Sherff, *C. pubescens* Ell., *C. heterolepis* Sherff, *C. grandiflora* Hogg and *C. auriculata* L. From many of these it stands apart on superficial as well as technical characters. *C. auriculata* is a stoloniferous plant with the lower leaves rounded or ovate and the small achenes (FIGS. 14 and 15) with narrow incurved wings. *C. lanceolata* is subscapose (with the rather small and often pinnately cleft leaves crowded at base), with inner involucre only 8–12 mm. long, the outer (FIG. 12) remaining appressed-ascending, pales only 4–6 mm. long, achenes (FIG. 13) smaller and with narrower wings. *C. corninsularis* is even smaller, 3–4 dm. high, with leaves only 1–6 mm. wide, outer involucre only 3–5 mm. long and of linear bracts, inner about 1 cm. long; the achenes smaller and with wings only 0.5–0.75 mm. wide. *C. debilis* is smaller still, with peduncles only 1–3 cm. long, ligules only 1 cm. long, inner involucre 7–8 mm. long and bodies of achenes only 2 mm. long and 1 mm. wide. *C. heterogyna* traces, by Sherff's key, nearly to his *C. intermedia* from Texas, a plant I have not seen. He describes it, however, as having petioles at most 4.5 (instead of 5–10) cm. long, blades obtuse (instead of acute), chiefly sessile (instead of petioled), outer involucral bracts lanceolate or linear-lanceolate and 4–8 mm. long (instead of deltoid-lanceolate and 7–9 mm. long), inner broadly lanceolate and 12–14 mm. long (instead of ovate and 1.5–1.7 cm. long), body of larger achenes 2–3 mm. long and 1.3–2 mm. wide, with wing only 0.2–0.4 mm. wide (instead of body 3.5–4 mm. long and 2–2.5 mm. wide, with wing 1–1.5 mm. wide). The large achene with broad wing and the long-petioled and acute leaves unite with the other characters to keep *C. heterogyna* apart. *C. pubescens* has relatively short elliptic to oblong-ovate leaf-blades, outer and inner involucres subequal, with the outer linear-lanceolate, pales at most 8 mm. long, achenes with bodies at most 3 mm. long, their wings only about 0.5 mm. wide. *C. heterolepis* has some of the leaves dissected, outer involucral bracts slenderly linear, inner bracts short, achenes oblong and at most 1.7 mm. long and with wing only 0.2–0.4 mm. broad. *C. grandiflora* has narrow leaves or leaf-segments (often

[1] Although the fact is not sharply brought out in Sherff's Revision of the Genus Coreopsis, most (if not all) the species of this series have achenes of quite different shapes and sizes. His measurements are presumably taken from the largest and central ones.

nearly linear-filiform), outer narrow involucral bracts appressed-ascending to maturity (FIG. 10), pales at most 7 mm. long and achenes (FIG. 11) up to 2.5 mm. long, with narrow wing.

C. AURICULATA L. GREENSVILLE COUNTY: rich deciduous woods by Metcalf Branch, east of Emporia, nos. 7982, 8507; rich deciduous woods by Three Creek, north of Emporia, no. 8509. SURRY COUNTY: calcareous, fossiliferous bushy slope near head of Sunken Meadow Creek, south of Claremont, no. 8508.

The only definite region of Virginia for this species cited by Sherff is Bedford County.

HELENIUM NUDIFLORUM Nutt. GREENSVILLE COUNTY: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 8511.

*ANTHEMIS ARVENSIS L., var. AGRESTIS (Wallr.) DC. SUSSEX COUNTY: roadside south of Stony Creek, no. 8513. GREENSVILLE COUNTY: cultivated field, 1 mile south of Emporia, no. 7983; seen rather generally through the region.

*CIRSIUM REPANDUM Michx. SOUTHAMPTON COUNTY: dry sandy open pine and oak woods 6 to 7 miles south of Franklin, no. 8516.

First from north of North Carolina.

*CNICUS BENEDICTUS L. DINWIDDIE COUNTY: in and about a newly seeded clover-field, southwest of Petersburg, no. 7986.

*SERINIA OPPOSITIFOLIA (Raf.) Ktze. SOUTHAMPTON COUNTY: roadside-ditch bordering alluvial woods, bottomland of Meherrin River, near Haley's Bridge, no. 8517.

Extension north from South Carolina.

*LACTUCA HIRSUTA Muhl. SOUTHAMPTON COUNTY: border of dry pine woods west of Adams Grove, no. 7720; dry white sand in woods, Terrapin Ridge, east of Drewryville, no. 9226. SUSSEX COUNTY: border of dry woods near Assamoosick Swamp, about 2 miles northeast of Homeville, no. 9227.

Typical *Lactuca hirsuta* is apparently rare. Familiar with the wide-ranging northern plant (Prince Edward Island to Virginia and less commonly to Louisiana and Texas), in which the stem is quite glabrous, the leaves glabrous or mostly so except for the midrib villous beneath, and the panicle commonly broad and subcorymbiform, we were at once struck by the great disparity of no. 7720, which attracted us, while we were driving past it, by its slender cylindric or racemiform panicle. We were further struck, when collecting it, by its stem densely villous on the lower fourth and the leaf-surfaces copiously pilose (almost velvety to the touch). In the Gray Herbarium this highly pubescent plant can be matched only by an old sheet

from Louisiana (*Hale*) which Torrey & Gray had cited under their *L. elongata*, γ. *sanguinea* (Bigel.) Torr. & Gray, Fl. N. Am. ii. 496 (1843). Torrey & Gray cited only four collections, two of which (from Massachusetts and Louisiana) are before me. The Massachusetts plant (type or isotype of *L. sanguinea* Bigelow) is the common extreme with glabrous stem and glabrous leaf-surfaces. One of Hale's Louisiana specimens is quite glabrous throughout (*L. hirsuta*, forma *calvifolia* Fernald in Rhodora, xxii. 156 (1920)), the other is the rare extreme with villous lower internodes, pilose leaf-surfaces and slender racemiform panicle (4 dm. long, 7 cm. in diameter). Torrey & Gray's description was all-inclusive: leaves "mostly hirsute-pubescent (as well as the stem) either throughout or on the midrib beneath." In the Synoptical Flora, Gray gave a similar inclusive account but, judging from the material in the Gray Herbarium, even at that late date he had only 5 specimens before him (2 from Massachusetts, 2 from Louisiana and 1 from Texas) and he gave its northeastern limit as "E. Massachusetts." Today, with 90 specimens in the Gray Herbarium and that of the New England Botanical Club, showing a range northeastward to Nova Scotia and Prince Edward Island, we can better evaluate the characters.

All material from eastern Canada and New England is consistent in having glabrous or very rarely sparsely hirsute lower internodes, glabrous or at most (and very exceptionally) sparsely pilose leaf-surfaces, with the midribs of the lower leaves villous (or in forma *calvifolia* glabrous), and the inflorescence, when well developed, corymbiform-paniculate, 1.5–6 dm. long by 0.5–5 dm. broad. The material in the Gray Herbarium from west and south of New England is too scanty for generalization. Most of it (from New Jersey, Virginia, Louisiana and Texas) is like the essentially uniform plant of New England. Our specimens above cited from southeastern Virginia, and one of the Hale sheets from Louisiana, as already noted, stand apart in having the lower internodes densely villous, both leaf-surfaces copiously pilose and the inflorescences racemiform (3–4.5 dm. long, by 7–10 cm. in diameter).

So accustomed are we to considering the plant of wide range (common in much of New England) as typical *Lactuca hirsuta* Muhl. that the original diagnosis published by Nuttall is a bit startling:

2. **hirsuta* Muhl. Catal. Lower part of stem and leaves hirsutely pilose, radical ones lyrate, segments truncate, subdentate, the upper leaves

partly runcinate-pinnatifid; flowers racemose, squamae subulate. Hab. in Pennsylvania. Pappus stipitate. *v. s.* In Herb. Muhl.—Nutt. Gen. ii. 124 (1818).

In his Catalogue (1813) Muhlenberg's description had been altogether too vague, he merely noting the "*Calix. Corolla*" as "lutpurp" (obviously referring to the yellow flowers and the purple involucres), with the only other character of the plant "hairy." In the 2-volume manuscript of Muhlenberg's unpublished *Florula Lancastriensis* (i. 552) in the library of the Gray Herbarium he gave a detailed characterization of the plant, under an unpublished name more appropriate than the published *L. hirsuta.* The pertinent phrases, which show what Muhlenberg had in mind, are as follows: "caule erecto (infra) hirsuto, supra glabro . . . foliis . . . subtus pilosis margine ciliatis, caulinis, sessilibus simplicibus raris." Muhlenberg's unpublished "foliis subtus pilosis" and Nuttall's published "leaves hirsutely pilose" (without restricting the pilosity to the midrib or the *lower* surface) have made it most important to see exactly what Muhlenberg had before him and what Nuttall had seen in Muhlenberg's herbarium. Dr. Pennell has most kindly sent me for examination all the material of *L. hirsuta* in the herbarium of the Academy of Natural Sciences of Philadelphia. This includes Muhlenberg's original sheet and another which Nuttall had labeled. The Muhlenberg type from the Lancaster region (although the label gives no clue to locality) is quite like our no. 7720, except that the inflorescence is extremely young and undeveloped, with only very young heads and the branches not yet elongated. A second sheet, erroneously labeled by Thomas Nuttall "*Galathenium Floridanum. Mulgedium Floridanum*" (presumably through transfer of labels[1]) has two specimens. One is essentially like the Muhlenberg type of *L. hirsuta,* but more complete and with better-developed heads. The other, more sparsely pubescent (or subglabrous) except the villous midrib beneath, has the slenderest of racemiform young panicles and is transitional between the extreme *L. hirsuta* (the type) and the smooth-stemmed *L. sanguinea* Bigel. This sheet was presumably part of the original collection of Muhlenberg's from near Lancaster.

A most important sheet is one from Porter's herbarium, a plant

[1] *Galathenium floridanum* (L.) Nutt. was based on *Sonchus floridanus* L. and *Mulgedium floridanum* (L.) DC.; and Nuttall correctly placed it in the group (*Galathenium* Nutt. being merely a renaming of *Lactuca* L.) with blue flowers. *Lactuca hirsuta* has yellow flowers.

collected in September, 1868, by McMinn in Elk County, in northwestern Pennsylvania, at the northern margin of the Allegheny Plateau; for the Elk County plant has the lower internodes of the stem and the leaf-surfaces as strongly pubescent as in the Muhlenberg type and the similar plants of Virginia and Louisiana, but the large and strongly branching panicle as corymbiform as in extreme *L. sanguinea*. In involucre and achenes the McMinn material is likewise inseparable from the latter.

From New York state the very few specimens seen are characteristic *Lactuca sanguinea*. At least the plant from near Cayuga Lake is clearly described as having the "leaves sparingly and coarsely setose along the midrib";[1] and Dr. House, who has most kindly sent me for study the series in the New York State Museum, can find only two sheets properly referable to the inclusive *L. hirsuta*. These are very characteristic *L. sanguinea* and both from the Champlain and upper Hudson drainage in the northeastern corner of the state.

Returning to Pennsylvania and New Jersey, the sheets at the Philadelphia Academy, including those of the Philadelphia Botanical Club, are all (except the Muhlenberg type and the Nuttall counterpart of it) characteristic *Lactuca sanguinea*, and all from the southern half of New Jersey.

As a result of the present study I am unable to keep apart as species *Lactuca hirsuta* and the usually very different *L. sanguinea;* but, whereas typical villous-stemmed and pilose-leaved *L. hirsuta* is very rare anywhere and not known north of Pennsylvania nor recently collected in the type-region, the smoother variety (*L. sanguinea*) is wide-ranging over much of the eastern portion of the United States and the Maritime Provinces and often frequent or common, as in most of New England, though as often absent from or very rare in adjacent areas, like New York, Pennsylvania and northern New Jersey. Much herbarium-material is erroneously identified, for, as pointed out by Wiegand and me in 1910, the key-character (villosity of the midrib) relied upon both in Gray's Manual and in Britton's is quite misleading. We then gave the significant differences between *L. hirsuta* and *L. canadensis* L.,[2] both of which may have the midrib

[1] Wiegand & Eames, Fl. Cayuga L. Basin, 427 (as *L. hirsuta*).

[2] In 1920 (Rhodora, xxii. 9–11) Wiegand published his very usable revision of the variations of *Lactuca canadensis* L. He did not, however, personally investigate the type of the species but deduced from the earlier treatment of Gray that "it is to be presumed that the Kalm specimen [the type] had divided leaves." Wiegand, conse-

either pubescent or glabrous beneath. The diagnostic characters of *L. hirsuta* then worked out are here repeated:

L. HIRSUTA. Lateral leaf-divisions oblong-obovate, commonly broadest above the base, often more or less truncate, usually dentate; involucre, when fully developed, 16–22 mm. long: mature achenes 7–9 mm. long from base to tip of beak: pappus 9–12 mm. long.

The bibliography of the three variations of *Lactuca hirsuta* follows:

LACTUCA HIRSUTA Muhl., var. **genuina.** Lower internodes of stem densely villous: leaves copiously pilose on both surfaces.—*L. hirsuta* Muhl. Cat. (1813); Nutt. Gen. ii. 124 (1818); Gray, Syn. Fl. N. Am. i^2. 442 (1884), in part only; Fernald & Wiegand in RHODORA, xii. 145 (1910), in part only. "*L. villosa* Muhl. *fl. Lancastr. ined.*" ex Torr. & Gray, Fl. N. Am. ii. 497 (1843) as synonym, not Jacq. (1798).—Dry woods and openings, very local, Pennsylvania to Virginia and Louisiana.

Var. **sanguinea** (Bigel.), comb. nov. Stem glabrous or essentially so throughout: lower leaves with midrib villous beneath, the surfaces glabrous or only sparsely pilose.—*L. sanguinea* Bigel. Fl. Bost. ed. 2: 287 (1824). *Galatheniium sanguineum* (Bigel.) Nutt. Trans. Am. Phil. Soc. vii. 444 (1841). *L. elongata*, γ. *sanguinea* (Bigel.) Torr. & Gray, l. c. 496 (1843).—Dry open woods and clearings, Prince Edward Island to western New York (presumably beyond), south to Virginia and less commonly to Louisiana and Texas.

Forma CALVIFOLIA Fernald. Leaves and stems glabrous throughquently treated as var. *typica* a plant with "Leaves with linear-falcate. . . lobes." The Linnean description indicated no such leaf, he saying "foliis lanceolato-ensiformibus dentatis," nor does the photograph of the type which Mr. Savage has kindly supplied me. The Kalm plant (type of *L. canadensis*) is characteristic *L. integrifolia* Bigel. or *L. canadensis*, var. *integrifolia* (Bigel.) Gray. Wiegand's *L. canadensis*, var. *typica*, taking for it the first name used varietally (and incidentally as a species) is

L. CANADENSIS L., var. LONGIFOLIA (Michx.) Farwell in Papers Mich. Acad. Sci. ii. 45 (1923). *L. longifolia* Michx. Fl. Bor.-Am. ii. 85 (1803). *L. elongata* Muhl. in Willd. Sp. Pl. iii. 1525 (1804). *L. elongata*, α. *longifolia* (Michx.) Torr. & Gray, Fl. N. Am. ii. 498 (1843). *L. canadensis*, var. *typica* Wiegand in RHODORA, xxii. 10 (1920). *L. canadensis*, var. *elongata* (Muhl.) Farwell in Pap. Mich. Acad. Sci. ii. 46 (1923).

In 1903 I examined Michaux's type of his *Lactuca longifolia* in Paris and made the memorandum that it had the middle and lower leaves as defined by Michaux: "Folia interdum versus medietatem laciniis 2–4-subruncinata, margine integerrima" and "foliis . . . amplexicaulibus."

In ordering up the material of *Lactuca*, the following combinations are required.

LACTUCA CANADENSIS L., var. OBOVATA Wieg., forma **Steelei** (Britton), comb. nov. *L. Steelei* Britton, Man. 899 (1901).

Forma *Steelei* seems to differ in no way from var. *obovata* except in having the stem quite villous nearly to the top and the midribs of the leaves villous; whereas var. *obovata* has the stem glabrous, except sometimes at base, and the leaves commonly glabrous.

L. LUDOVICIANA (Nutt.) Riddell, forma **campestris** (Greene), comb. nov. *L. campestris* Greene, Pittonia, iv. 37 (1899).

Differing from the yellow-flowered *Lactuca ludoviciana* only in having bluish flowers and occurring through essentially the same range.

out.—Rhodora, xxii. 156 (1920).—Scattered through the range of var. *sanguinea*.

*Hieracium florentinum All. Prince George County: roadsides and fields, Camp Lee, no. 8519.

A most undesirable weed, one of the worst pests of hay-fields in southern Canada and the northeastern states.

Explanation of Plates 509–535

Plate 509. Paspalum bifidum (Bertol.) Nash, var. projectum, n. var.: fig. 1, plant, × 2/5, from east of Burt, Virginia, *Fernald & Long*, no. 7239 (type); fig. 2, sheath, × 4, from type; fig. 3, spikelet, showing 1st glume, × 10, from type.

Plate 510. Bulbostylis capillaris (L.) C. B. Clarke: fig. 1, type of *Scirpus capillaris* L., × 1, courtesy of Mr. S. Savage; fig. 2, base, × 2, of type of *Stenophyllus capillaris* (L.) Britton, var. *cryptostachys* Fernald; fig. 4, inflorescences, × 1, of the latter.

Var. crebra, n. var.: fig. 4, type, × 1; fig. 5, base of type, × 2.

Var. isopoda, n. var.: fig. 6, inflorescences, × 1, of type.

Plate 511. Carex digitalis Willd.: fig. 1, inflorescence, × 1, from Brookland, District of Columbia, May 23, 1912, *Holm;* fig. 2, inflorescence, × 1, from Lake Chautauqua, New York, June 5, 1893, *Churchill.*

Var. macropoda, n. var.: fig. 3, plant, × 2/5, of the type; fig. 4, summit of inflorescence, × 1, from Wilmington, North Carolina, *M. A. Curtis.*

Plate 512. Smilacina racemosa (L.) Desf.: summit of one of the type specimens, × 1, of *Convallaria racemosa*, L. in Hortus Cliffortianus (Herb. Clifford). Kindness of Mr. John Ramsbottom.

Plate 513. Smilacina racemosa (L.) Desf., var. cylindrata, n. var.: fig. 1, portion of flowering plant, × 1, from campus of University of Richmond, Westhampton, Virginia, May 12, 1927, *F. H. W.;* fig. 2, fruit of the type.

Plate 514. Comptonia peregrina (L.) Coulter: fig. 7, young (autumnal) staminate aments, × 1, from Jaffrey, New Hampshire, *Robinson*, no. 397; fig. 8, fruiting aments, × 1, from Pembroke, Maine, *Fernald*, no. 1698; fig. 9, portion of branchlet, × 10, to show pubescence, from no. 1698; fig. 10, lower surface of leaf, × 10, from no. 1698.

Var. asplenifolia (L.) Fernald. Figs. 1 and 2, drawings of staminate (his fig. 7) and pistillate (his fig. 6) branches, × 1, from Plukenet's illustration of his *Myrti brabanticae affinis americana, foliorum laciniis asplenii modo divisis*, basis of *Myrica asplenifolia* L.; fig. 3, young (midsummer) staminate aments × 1, from south of Franklin, Virginia, *Fernald & Long*, no. 8229; fig. 4, pistillate (fruiting) aments, × 1, from no. 8229; fig. 5, portion of branchlet, × 10, to show puberulence, from no. 8229; fig. 6, lower surface of leaf, × 10, from no. 8229.

Plate 515. Polygonum setaceum Baldwin, var. typicum: fig. 1, lower surface of leaf, × 10, from north of Blackwater River, Princess Anne County, Virginia, *Fernald & Long*, no. 3916; fig. 2, upper surface of leaf, × 10, from no. 3916.

Var. INTERJECTUM, n. var.; FIG. 3, lower surface of leaf, × 10, from the TYPE; FIG. 4, upper surface of leaf, × 10, from the TYPE.

Var. TONSUM, n. var.: FIG. 5, TYPE, × ⅖; FIG. 6, upper surface of leaf, × 10, from the TYPE.

PLATE 516. CLAYTONIA VIRGINICA L.: FIG. 2, tip of inflorescence, × 1, from Louisville, Kentucky, *L. G. Blumer*, no. 231.

Forma MICROPETALA, n. form: FIG. 1, TYPE, × 1.

PLATE 517. RANUNCULUS ALLENII Robinson: FIG. 5, portion of flowering plant, × 1, from Tabletop Mts., Gaspé County, Quebec, *Fernald, Dodge & Smith*, no. 25,759; FIG. 6, fruit, × 4, from no. 25,759.

R. ALLEGHENIENSIS Britton: FIG. 1, fruit, × 4, from Elk Mt., Pocahontas County, West Virginia, *C. A. & U. F. Weatherby*, no. 6416.

R. MICRANTHUS Nutt.: FIG. 2, plant, × 1, from Vesta, Wilson County, Tennessee, *Svenson*, no. 7746; FIG. 3, flowering tip, × 4, from no. 7746.

R. HARVEYI (Gray) Britton: FIG. 4, portion of flowering plant, × 1, from Little Rock, Arkansas, *H. E. Hasse*.

PLATE 518. RANUNCULUS ABORTIVUS L., var. INDIVISUS, n. var.: FIG. 1, TYPE, × ⅖; FIG. 2, fruit, × 4, from TYPE.

PLATE 519. RANUNCULUS ABORTIVUS L., var. ACROLASIUS, n. var.: FIG. 1, TYPE, × ⅖; FIG. 2, flower, × 4, from TYPE.

Var. EUCYCLUS Fernald: FIG. 3, basal leaf, × 1, from the TYPE.

PLATE 520. DENTARIA LACINIATA Muhl., var. COALESCENS, n. var. (all figs. × 1): FIG. 1, summit of fruiting plant (TYPE); FIG. 2, a single pinnatifid cauline leaf from the TYPE; FIG. 3, young plant (TYPE).

PLATE 521. RUBUS LONGII, n. sp.: fruiting branch, × 1, from the TYPE.

PLATE 522. RUBUS LONGII, n. sp.: FIG. 1, portion of primocane with foliage, × ¾, from TYPE; FIG. 2, portion of stem and base of petiole, to show pubescence, × 4; FIG. 3, upper surface of leaf, to show pubescence, × 10; FIG. 4, lower surface of leaf, to show pubescence, × 10.

PLATE 523. DESMODIUM CILIARE (Muhl.) DC., var. LANCIFOLIUM Fernald & Schubert, n. var.: TYPE, × ½.

PLATE 524. LESPEDEZA CAPITATA L., var. HIRTIFORMIS, n. var.: TYPE, × ⅖.

PLATE 525. POLYGALA VERTICILLATA L., var. DOLICHOPTERA, n. var.: FIG. 1, one of the TYPE-SPECIMENS, × 1; FIG. 2, portion of raceme, × 6, from the TYPE.

Var. AMBIGUA (Nutt.) Wood: FIG. 3, raceme, × 1, from southeast of Emporia, Virginia, *Fernald & Long*, no. 8333; FIG. 4, portion of raceme, × 6, from no. 8333.

PLATE 526. VIOLA KITAIBELIANA Roem. & Schultes: FIG. 5, flowering plant, × 1, from Switzerland, *F. O. Wolf* in W. Becker, Viol. Exsicc. VII. Lief. no. 180; FIG. 6, fruiting summit, × 1, from Bithynia, *Bornmüller*, no. 13,739; FIG. 3, calyx, × 2, from no. 13,739; FIG. 8, margin of sepal, × 8, from Bohemia, *Petrak*, Fl. Bohem. Morav. Exsicc. Lfg. IX. no. 830.

Var. RAFINESQUII (Greene) Fernald: FIG. 1, portion of flowering plant, × 1, from District of Columbia, *E. R. Reynolds* in Dowell, N. Am. Violets, no. 1A; FIG. 2, portion of plant in bud, from Lancaster County, Pennsylvania, May 11, 1901, *Heller;* FIG. 7, calyx, × 2, from Lancaster County, Pennsylvania, May 9, 1891, *Small;* FIG. 4, margin of sepal from same plant as FIG. 7.

PLATE 527. SANICULA MARILANDICA L., VAR. PETIOLULATA, n. var.: TYPE-SPECIMEN, × ½.

PLATE 528. FRAXINUS TOMENTOSA Michx. f. (all figs. × 1): FIGS. 1 and 2, lateral leaflet and samaras, after Michaux filius; FIGS. 3 and 4, lateral leaflets and samaras of *F. profunda* Bush from Kennett, Missouri, *Bush*, no. 447; FIGS. 5 and 6, portion of lateral leaflet and samaras from Drewryville, Virginia, *Fernald, Long & Smart*, no. 5891 (distrib. as *F. profunda*).

PLATE 529. FRAXINUS PENNSYLVANICA Marshall: FIG. 3, fruits, × 1, from Jamaica Plain, Massachusetts, *Faxon;* FIG. 4, fruits, × 1, from McCalls Ferry, Pennsylvania, *Rose & Painter*, no. 8169.

Var. AUSTINI, n. var.: FIG. 1, portion of TYPE, × 1, from Westfield, New Brunswick, *Fernald*, no. 2069; FIG. 2, fruits, × 1, from Closter, New Jersey, *C. F. Austin.*

PLATE 530. PLANTAGO VIRGINICA L.: FIG. 1, leaves and scapes, × 1, from Richmond, Virginia, May 13, 1911, *Churchill;* FIG. 2, upper surface of leaf, × 5, and FIG. 3, base of spike, × 5, both from same plant as FIG. 1. Var. VIRIDESCENS, n. var.: FIG. 4, plant, × 1, from TYPE-COLLECTION; FIG. 5, upper surface of leaf, × 5, and FIG. 6, base of spike, × 5, from TYPE.

PLATE 531. CHRYSOPSIS LONGII, n. sp.: FIG. 1, small plant, × ½, from TYPE-COLLECTION; FIG. 2, involucre, × 1, from TYPE; FIG. 3, disk-corolla, × 7, from TYPE; FIG. 4, achene, × 7, from TYPE-STATION, *Braxton Townsend*, no. 7725.

C. GOSSYPINA (Michx.) Nutt.: FIG. 5, involucre, × 1, from Muscogee County, Georgia, September 10, 1883, *J. D. Smith;* FIG. 6, disk-corolla, × 7, from same collection; FIG. 7, achene, × 7, from Augusta, Georgia, October, 1843, *Asa Gray.*

PLATE 532. SOLIDAGO PERLONGA, n. sp.: FIG. 1, plant, × ⅖, from Westhampton, Virginia, *Fernald & Long*, no. 7668; FIG. 2, characteristic reticulation of leaf, × 10, from the TYPE; FIG. 3, involucre, × 5, from no. 7668; FIG. 4, achene, × 10, from no. 7668.

S. AUSTRINA Small: FIG. 5, reticulation of leaf, × 10, from near Loganville, Georgia, *Small* (ISOTYPE); FIG. 6, involucre, × 5, from ISOTYPE; FIG. 7, achene, × 10, from ISOTYPE.

PLATE 533. COREOPSIS ONISCICARPA, n. sp.: FIG. 1, plant, × ½, from northeast of Courtland, Virginia, *Fernald & Long*, no. 7712; FIG. 2, head, × 1, from same collection.

PLATE 534. COREOPSIS ONISCICARPA, n. sp.: FIG. 1, involucre, × 2, from the TYPE; FIG. 5, pale and disk-corolla, × 10, from the TYPE; FIG. 8, achenes, × 10, showing variations, from TYPE.

C. GLADIATA Walt.: FIG. 2, involucre, × 2, from near Jacksonville, Florida, *A. H. Curtiss*, no. 1477, in part; FIG. 10, achene, × 10, from no. 1477.

C. LONGIFOLIA Small.: FIG. 3, involucre, × 2, from near Jacksonville, Florida, *Curtiss*, no. 6278; FIG. 6, pale and disk-corolla, × 10, from near Jacksonville, *Curtiss*, no. 1477 in part; FIG. 9, achene, × 10, from same collection.

C. FALCATA Boynton: FIG. 4, involucre, × 2, from north of Washington, North Carolina, *Wiegand & Manning*, no. 3410; FIG. 7, pale and disk-corolla, × 10, from no. 3410; FIG. 11, achene, × 10, from no. 3410.

PLATE 535. COREOPSIS HETEROGYNA, n. sp.: FIG. 1, ISOTYPE, × ½; FIG. 2, involucre, × 1; FIG. 3, pale, × 4; FIG. 4, disk-flower, × 4; FIGS.

5 and 6, large central achenes (dorsal view), × 4; FIG. 7, central achene (ventral view), × 4; FIGS. 8 and 9, smaller achenes, × 4.

C. GRANDIFLORA Hogg.: FIG. 10, involucre, × 1, from between Oconee and Gwinnett Counties, Georgia, July 14, 1893, *Small;* FIG. 11, large central achene (dorsal view), × 4, from Little Stone Mt., Georgia, *A. H. Curtiss*, no. 6467.

C. LANCEOLATA L.: FIG. 12, involucre, × 1, from Redding's Mill, Missouri, *E. J. Palmer*, no. 2386; FIG. 13, large central achene (dorsal view), × 4, from Alpena, Michigan, *Fernald & Pease*, no. 3565.

C. AURICULATA L.: FIGS. 14 and 15, achenes (dorsal and ventral views), × 4, from east of Emporia, Virginia, *Fernald & Long*, no. 8507.

Photo. E. C. Ogden.

PASPALUM BIFIDUM, VAR. PROJECTUM: FIG. 1, plant, × 2/5, of TYPE-COLLECTION; FIG. 2, sheath, × 4; FIG. 3, spikelet, showing 1st glume, × 10.

Photo. E. C. Ogden.

BULBOSTYLIS CAPILLARIS: FIG. 1, TYPE of *Scirpus capillaris* L., × 1 (courtesy of Mr. SPENCER SAVAGE); FIG. 2, base of type of *Stenophyllus capillaris*, var. *cryptostachys*, × 2; FIG. 3, inflorescences of the latter, × 1.

Var. CREBRA: FIG. 4, portion of type, × 1; FIG. 5, base of TYPE, × 2.

Var. ISOPODA: FIG. 6, inflorescences of TYPE, × 1.

Photo. H. G. Fernald.

CAREX DIGITALIS: FIGS. 1 and 2, inflorescences, × 1.
Var. MACROPODA: FIG. 3, type, × $^{2}/_{5}$; FIG. 4, inflorescence, × 1.

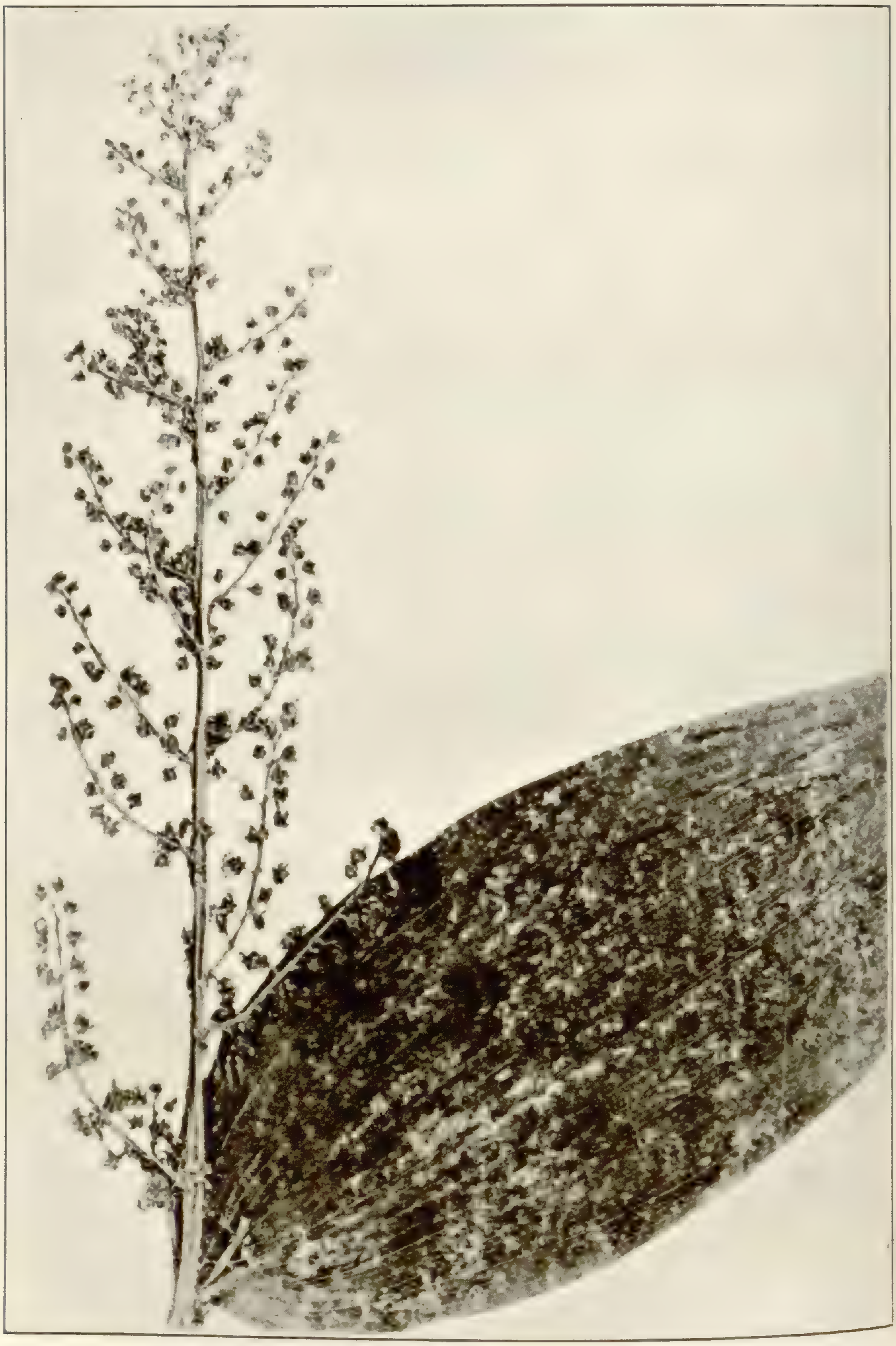

Photo. H. G. Fernald.

SMILACINA RACEMOSA, var. TYPICA: TYPE, × 1, of *Convallaria racemosa* L. in Clifford Herbarium (courtesy of Mr. JOHN RAMSBOTTOM).

Photo. H. G. Fernald.

SMILACINA RACEMOSA, var. CYLINDRATA: FIG. 1, flowering tip, × 1; FIG. 2, fruit of TYPE, × 1.

Photo. H. G. Fernald.

COMPTONIA PEREGRINA: FIG. 7, young staminate inflorescence, × 1; FIG. 8, fruiting aments, × 1; FIG. 9, young branchlet, × 10; FIG. 10, lower surface of leaf, × 10.

Var. ASPLENIFOLIA: FIGS. 1 and 2, staminate and pistillate branchlets of *Myrti brabanticae affinis americana, foliorum laciniis asplenii modo divisis* of Plukenet, basis of *Myrica asplenifolia* L., copied from PLUKENET, × 1; FIGS. 3 and 4, staminate and pistillate branchlets, × 1, from Virginia; FIG. 5, young branchlet, × 10; FIG. 6, lower surface of leaf, × 10.

Photo. H. G. Fernald.

POLYGONUM SETACEUM, var. TYPICUM: FIGS. 1, lower, and 2, upper surface of leaf, × 10.

Var. INTERJECTUM: FIGS. 3, lower, and 4, upper surface of leaf, × 10, from TYPE.

Var. TONSUM: FIG. 5, TYPE, × $^{2}/_{5}$; FIG. 6, upper surface of leaf, × 10, from TYPE.

Photo. H. G. Fernald.

CLAYTONIA VIRGINICA: FIG. 2, young inflorescence, × 1.
Forma MICROPETALA: FIG. 1, TYPE, × 1.

Photo. H. G. Fernald

RANUNCULUS ALLEGHENIENSIS: FIG. 1, fruiting head, × 4.
R. MICRANTHUS: FIG. 2, plant, × 1; FIG. 3, flower, × 4.
R. HARVEYI: FIG. 4, portion of plant, × 1.
R. ALLENII: FIG. 5, portion of flowering plant, × 1; FIG. 6, fruiting head, × 1.

Photo. H. G. Fernald.

RANUNCULUS ABORTIVUS, VAR. INDIVISUS: FIG. 1, TYPE, × 2/5; FIG. 2, fruiting head, × 4.

Photo. H. G. Fernald.

RANUNCULUS ABORTIVUS, var. ACROLASIUS: FIG. 1, TYPE, × 3/5; FIG. 2, flower, × 4.
Var. EUCYCLUS: basal leaf of TYPE, × 1.

Photo. H. G. Fernald.

DENTARIA LACINIATA, var. COALESCENS: TYPE, × 1.

Photo. H. G. Fernald.

RUBUS LONGII: fruiting branch from TYPE, × 1.

Photo. H. G. Fernald.

RUBUS LONGII: FIG. 1, portion of primocane, × ¾; FIG. 2, base of petiole, × 4; FIG. 3, upper surface of leaf, × 10; FIG. 4, lower surface of leaf, × 10.

Photo. H. G. Fernald

DESMODIUM CILIARE, var. LANCIFOLIUM, × ½.

Photo. H. G. Fernald.

LESPEDEZA CAPITATA, var. HIRTIFORMIS: TYPE, × $\frac{2}{5}$.

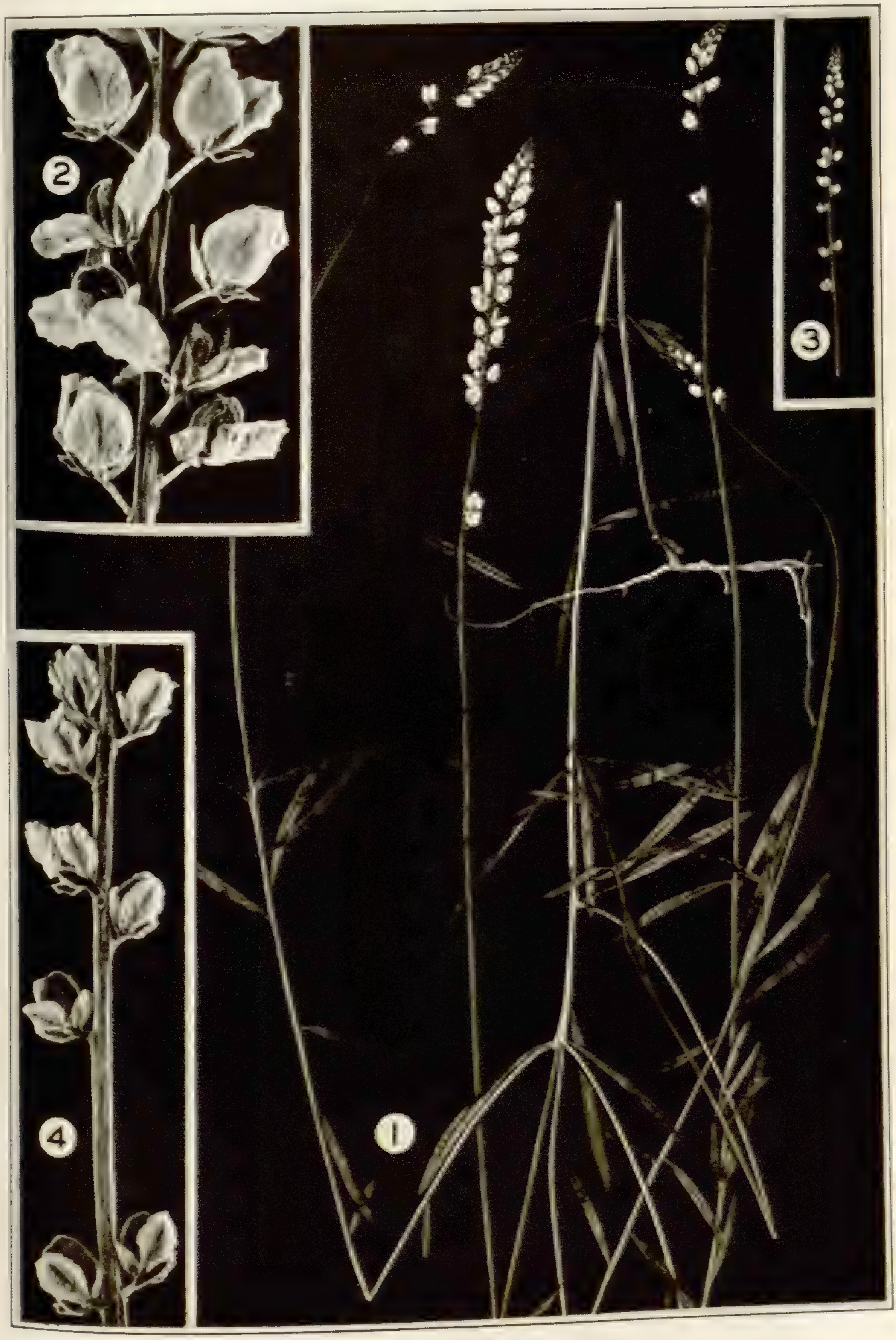

Photo. H. G. Fernald.

POLYGALA VERTICILLATA, var. DOLICHOPTERA: FIG. 1, TYPE, × 1; FIG. 2, portion of raceme, × 6.

Var. AMBIGUA: FIG. 3, raceme, × 1; FIG. 4, portion of raceme, × 6.

Photo. H. G. Fernald.

VIOLA KITAIBELIANA: FIG. 5, flowering plant, × 1, from Switzerland; FIG. 6, fruiting summit, × 1, from Bithynia; FIG. 3, calyx, × 2, from same plant as FIG. 6; FIG. 8, margin of sepal, × 8, from Bohemia.

V. KITAIBELIANA, var. RAFINESQUII: FIG. 1, portion of flowering plant, × 1, from District of Columbia; FIG. 2, portion of plant, × 1, from Pennsylvania; FIG. 7, calyx, × 2, from Pennsylvania; FIG. 4, margin of sepal, × 8, from Pennsylvania.

Photo. H. G. Fernald.

SANICULA MARILANDICA, var. PETIOLULATA, × ½.

Photo. H. G. Fernald.

FRAXINUS TOMENTOSA, lateral leaflet and samaras: FIGS. 1 and 2, after Michaux filius; FIGS. 3 and 4, *P. profunda* from Missouri; FIGS. 5 and 6, from Virginia.

Photo. H. G. Fernald.

FRAXINUS PENNSYLVANICA: FIG. 3, fruit from Massachusetts; FIG. 4, fruit from Pennsylvania.

Var. AUSTINI: FIG. 1, portion of TYPE, from New Brunswick; FIG. 2, fruit from New Jersey (*Austin*).

Photo. H. G. Fernald.

PLANTAGO VIRGINICA: FIG. 1, leaves and scapes, × 1; FIG. 2, upper surface of leaf, × 5; FIG. 3, base of spike, × 5.

Var. VIRIDESCENS: FIG. 4, TYPE, × 1; FIG. 5, upper surface of leaf, × 5; FIG. 6, base of spike, × 5.

Photo. E. C. Ogden.

CHRYSOPSIS LONGII: FIG. 1, small plant, × 1/2; FIG. 2, involucre, × 1; FIG. 3, disk-corolla, × 7; FIG. 4, achene, × 7.
C. GOSSYPINA: FIG. 5, involucre, × 1; FIG. 6, disk-corolla, × 7; FIG. 7, achene, × 7.

Photo. E. C. Ogden.

SOLIDAGO PERLONGA: FIG. 1, plant, × $\frac{2}{5}$, from Virginia; FIG 2, reticulation of leaf, × 10, from TYPE; FIG. 3, involucre, × 5; FIG. 4, achene, × 10.
S. AUSTRINA: FIG. 5, reticulation of leaf, × 10, from ISOTYPE; FIG. 6, involucre, × 5, from ISOTYPE; FIG. 7, achene, × 10, from ISOTYPE.

Photo. E. C. Ogden.

COREOPSIS ONISCICARPA: FIG. 1, plant. × ½; FIG. 2, head, × 1

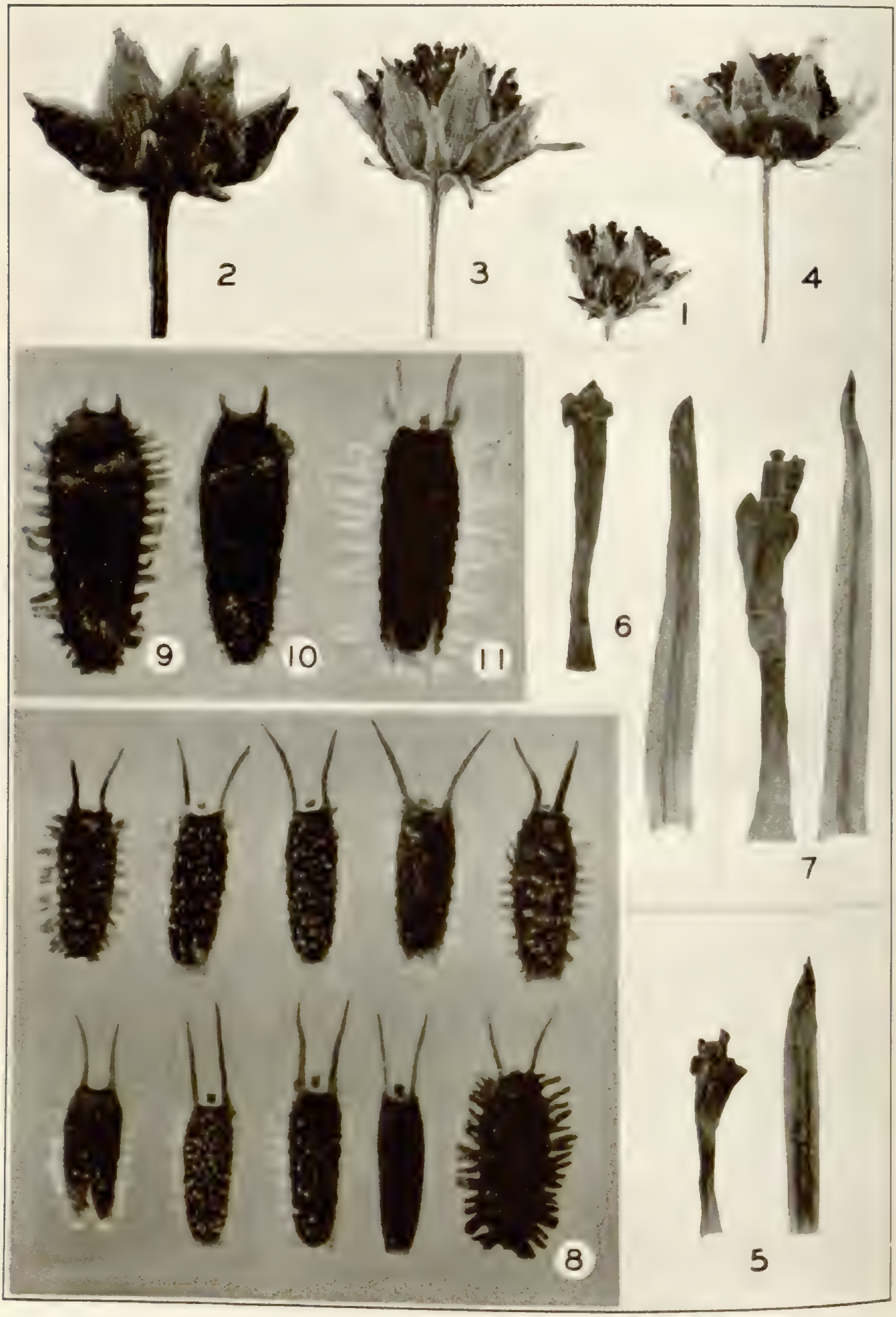

Photo. E. C. Ogden.

COREOPSIS ONISCICARPA: FIG. 1, involucre, × 2, from TYPE; FIG. 5, pale and disk-corolla, × 10, from TYPE; FIG. 8, achenes, × 10, showing variations, from TYPE.

C. GLADIATA: FIG. 2, involucre, × 2; FIG. 10, achene, × 10.

C. LONGIFOLIA: FIG. 3, involucre, × 2; FIG. 6, pale and disk-corolla, × 10; FIG. 9, achene, × 10.

C. FALCATA: FIG. 4, involucre, × 2; FIG. 7, pale and disk-corolla, × 10; FIG. 11, achene, × 10.

Photo. H. G. Fernald.

COREOPSIS HETEROGYNA: FIG. 1, isotype, × ½; FIG. 2, involucre, × 1; FIG. 3, pale, × 4; FIG. 4, disk-flower, × 4; FIGS. 5 and 6, large central achenes (dorsal view), × 4; FIG. 7, central achene (ventral view), × 4; FIGS. 8 and 9, smaller achenes, × 4.

C. GRANDIFLORA: FIG. 10, involucre, × 1; FIG. 11, large central achene (dorsal view), × 4.

C. LANCEOLATA: FIG. 12, involucre, × 1; FIG. 13, large central achene (dorsal view), × 4

C. AURICULATA: FIGS. 14 and 15, achenes (dorsal and ventral views), × 4.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY,—CXXIV.

1. NOTES ON LAMOUROUXIA.

By Francis W. Hunnewell and Lyman B. Smith.

In the course of a recent visit to Guatemala, the senior author collected two numbers of *Lamourouxia* at rather widely separated localities. Both of these ran down to *L. dependens* Benth. in the revision of the genus by Robinson and Greenman in the American Journal of Science, i. 169 (1895), but did not agree with the only material so labelled in the Gray Herbarium, namely the numbers of Ghiesbreght from Mexico. It should be noted that these were only doubtfully referred to *L. dependens* by Robinson and Greenman.

Through the kindness of Sir Arthur W. Hill it was possible to borrow the type of *L. dependens* from Kew and settle what relation it bore to our material. At the same time Dr. W. R. Maxon kindly lent us all the material under the species at the National Herbarium.

It was immediately evident that all the material at hand divided into two series, the Guatemalan, including the type of *L. dependens*, and the Mexican. The Mexican material constitutes a single relatively constant species.

The Guatemalan collections on the other hand show considerable variation, and it would be possible to distinguish each collection on some slight tendency of the calyx or corolla were this desirable. Until we have seen much more material it seems wiser to base categories on only the stronger characters, and in this way we divide the Guatemalan material into two species and a variety.

The following key will serve to separate the categories under discussion and at the same time place them in relation to the treatment of Robinson and Greenman where they belong with species 8 to 11 in the synoptic key:

1. Calyx glabrous; stamens conspicuously exserted . . . . . *L. exserta.*
1. Calyx more or less pubescent.
   2. Leaves sessile or subsessile, broadly ovate. . . . . *L. macrantha.*
      3. Calyx-lobes entire; flowers 6 cm. long . . . . . *L. ovata.*
      3. Calyx-lobes serrulate; flowers 3–4 cm. long . . . . . *L. dependens.*
   2. Leaves distinctly petiolate, lance-ovate or oblong-lanceolate.

4. Calyx-lobes narrowly triangular, acute, entire; base of the lip oblong, about twice as long as broad. . . . . *L. stenoglossa.*
4. Calyx-lobes abruptly acute or obtuse, usually serrulate; base of the lip subquadrate, nearly or quite as broad as long.
5. Galea acute or apiculate.
6. Lobes of the lip rounded; galea without lateral apiculae. . . . . *L. dependens.*
6. Lobes of the lip truncate-apiculate; galea with lateral apiculae. . . . . *L. dependens* var. *apiculata.*
5. Galea truncate, emarginate. . . . . *L. montana.*

Lamourouxia stenoglossa, spec. nov., frutex, verisimiliter scandens; ramis gracillimis; ramulis florigeris 2–4 dm. longis, lineis binis puberulis exceptis glabris; foliis petiolatis, oblongo-lanceolatis, late acutis vel obtusis apiculatisque, latissime cuneatis, ad 6 cm. longis et 25 mm. latis, subduplicato-serratis, glabris vel subglabris, petiolis ad 4 mm. longis; floribus laxe racemosis; pedicellis gracilibus, 1–2 cm. longis, puberulis; calyce per anthesin 9–13 mm. longo, dense vel sparse puberulo, lobis anguste triangularibus, acutis, integris, postremis paulo majoribus; corolla 35–40 mm. longa, tubo e basi gracili ampliato, trichomatibus articulatis minutis dense induta, galea ad 20 mm. lata, apice latissime triangulari, labio infero angusto, trilobato, lobis obtusis; staminibus inclusis. Pl. I, fig. 11–12.

MEXICO: CHIAPAS: without further data, *Ghiesbreght 74, 173, 176* (all on one label, G); Cerro de Huitepeque, alt. 2300 m., 1864–70, *Ghiesbreght 706* (G, TYPE); near San Cristobal, alt. 2100–2700 m., Sept. 1895, *E. W. Nelson 3213* (G, US).

Lamourouxia dependens Benth. in DC. Prodr. x. 539 (1846). Pl. I, fig. 6–7.

GUATEMALA: without further locality, 1842, *Skinner* (K, TYPE; phot. G); CHIMALTENANGO: climbing in thickets, Chichoy Pass, alt. 3150 m., Jan. 1937, *Hunnewell 14855* (G); SACATEPEQUEZ: Volcan de Agua, alt. 2750 m., April 1890, *J. D. Smith 2162* (US); same, Feb. 1905, *Kellerman 4744* (US).

Var. **apiculata**, var. nov., corollae galea apiculis binis lateralibus munite, labii inferi lobis truncatis apiculatisque. Pl. I, fig. 8.

GUATEMALA: CHIMALTENANGO: straggling on bushes, "Santa Elena," alt. 2400–2700 m., Jan. 1933, *Skutch 154* (US, TYPE; phot. G).

Lamourouxia montana, spec. nov., frutex scandens, 1–2 m. alta; ramis gracillimis, reflexis, mox glabris; ramulis florigeris 15–20 cm. longis, puberulis; foliis petiolatis, lanceolato-ovatis, acutis, late cuneatis, ca. 4 cm. longis et 2 cm. latis, grosse serratis, mox glabris, petiolis ad 5 mm. longis; floribus dense vel laxe racemosis, inversis,

secundis; pedicellis gracilibus, puberulis, 5–12 mm. longis; calyce per anthesin 10–14 mm. longo, maturitate ampliato, cinereo-puberulo, lobis oblongis, late acutis, ad apicem versus grosse serratis, postremis paulo majoribus; corolla 4–5 cm. longa, tubo e basi gracili ampliato, trichomatibus articulatis minutis dense induta, galea ad 18 mm. lata, truncata, paulo emarginata, labio infero aequaliter trilobato, lobis oblongis, obtusis, 5 mm. longis, 3 mm. latis; staminibus exsertis. Pl. I, fig. 9–10.

GUATEMALA: Chimaltenango: Volcan Acatenango, alt. 2450 m., Feb. 1937, *Hunnewell 14856* (G, type); Sacatepequez: Volcan de Agua, above Santa Maria de Jesus, Mar. 1916, *Holway 568* (US, phot. G).

Holway 568 is somewhat smaller in leaves and corollas than is the type and the corners of the galea are nearly straight while in the type they are auricled.

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2. HERBARIUM NOTES,—I.

By Lyman B. Smith.

Eriocaulon ligulatum (Vell.), comb. nov. *Dupatya ligulata* Vell. Fl. Flum. 36 (1825); Icones, i. t. 86 (1827). *E. Kunthii* Koern. in Mart. Fl. Bras. iii. pt. 1, 482 (1863).

HELICONIA L. Mant. ii. 147 (1771), nomen conservandum, International Rules of Botanical Nomenclature (Vienna), 76 (1906). *Bihai* Adans. Fam. ii. 67 (1763).

Heliconia Cardenasii, spec. nov., 2 m. alta, glabra; foliis brevissime (usque 5 mm. longe) petiolatis, laminis lanceolato-ellipticis, ad 3 dm. longis et 11 cm. latis, paulo inaequaliteralibus, basi subcordatis, apice in acumen 3–4 cm. longum abrupte contractis, utrinque viridibus, costa supra impressa, subtus prominente, nervis lateralibus tenuissimis; pedunculo inflorescentiae erecto, gracili, 13–22 cm. longo; inflorescentia deflexa, laxa, glabra, 12 cm. longa, rhachi flexuosa; bracteis patentibus, lineari-lanceolatis, acuminatis, rubris, bractea ima ad 13 cm. longa, reliquis multo brevioribus; internodiis sub anthesi ca. 2 cm. longis; prophyllis ovatis, acutis, ca. 4 cm. longis, tenuissimis; pedicellis 12–15 mm. longis; tepalis 5 cm. longis. Pl. II, fig. 4–6.

BOLIVIA: Cochabamba: wet soil at edge of forest, Chimoré, Nov. 1937, *Cardenas 2059* (G, type).

Habitally this species closely resembles *H. hirsuta* except that the

inflorescence is sharply deflexed from the summit of the peduncle instead of erect.

Heliconia densa (Griggs), comb. nov. *Bihai densa* Griggs in Bull. Torr. Bot. Club, xlii. 320, fig. 1 (1915).

Heliconia geniculata (Griggs), comb. nov. *Bihai geniculata* Griggs in Torreya, vii. 230, fig. 1 (1908).

Heliconia Griggsiana, spec. nov., robusta, e fragmentis solum cognita, verisimiliter permagna; foliorum laminis ad 34 cm. latis, basi subcordatis, supra viridibus, subtus plus minusve glauco-viridibus, costa supra impressa, subtus prominente, nervis lateralibus 5–7 mm. distantibus; pedunculi inflorescentiae apice solum cognito, valido, curvato; inflorescentia verisimiliter deflexa, 4–5 dm. longa, laxa, rhachi flexuosa, glabra; bracteis patentibus, lineari-lanceolatis, apice abrupte acutis, rubris, glabris, ima ad 22 cm. longis, reliquis gradatim brevioribus; internodiis sub anthesi 3–5 cm. longis; prophyllis triangulari-ovatis, acuminatis, ad 8 cm. longis, 22 mm. latis, carinatis, subcoriaceis, persistentibus, extus dense fulvo-pubescentibus, intus glabris; pedicellis ad 2 cm. longis; tepalis linearibus, 6 cm. longis, in vivo flavis, exterioribus pubescentibus, interioribus glabris. Pl. II, fig. 7–10.

COLOMBIA: Caldas: bank at edge of forest, Rio Navarco, Salento, alt. 1400–1700 m., July 1922, *Pennell 9085* (G, TYPE; US, NY, Phila.).

Whether the inflorescence is decurved or not is not wholly certain, but in either case this species is easily distinguished by its large firm and persistent prophyllae. It is a pleasure to name this outstanding species for Dr. Robert F. Griggs whose studies have done much to clarify the difficult genus, *Heliconia*.

Heliconia Harrisiana (Griggs), comb. nov. *Bihai Harrisiana* Griggs in Bull. Torr. Bot. Club, xlii. 328, pl. 19 (1915).

Heliconia punicea (Griggs), comb. nov. *Bihai punicea* Griggs in Bull. Torr. Bot. Club, xlii. 321, fig. 2 (1915).

Heliconia sylvestris (Gleason), comb. nov. *Bihai sylvestris* Gleason in Bull. Torr. Bot. Club, lii. 192 (1925).

Hippeastrum deflexum (Rusby), comb. nov. *Lepidoparyna deflexa* Rusby in Mem. N. Y. Bot. Gard. vii. 214 (1927).

Rechsteineria verticillata (Vell.), comb. nov. *Orobanche verticillata* Vell. Fl. Flum. 255 (1825), Icones, vi. t. 64 (1827). *Gesneria verticillata* Hook. in Bot. Mag. liv. t. 2776 (1827). *Corytholoma verticillatum* (Hook.) Fritsch in Bihang till K. Sv. Vet. Akad. Handl. xxiv. Afd. 3, No. 5, 19 (1898).

3. STUDIES IN THE BROMELIACEAE,—IX.

By Lyman B. Smith.

Aechmea bromeliaefolia (Rudge) Bak. in Benth. & Hook. f. Gen. iii. 664 (1883). *Tillandsia bromeliaefolia* Rudge, Pl. Guian. 32, t. 50 (1807). *Bromelia tinctoria* Mart. in Spix & Mart. Reise in Brasilien, ii. 554 (1828). *Macrochordium pulchrum* Beer, Bromel. 147 (1857). *Aechmea tinctoria* (Mart.) Mez in Mart. Fl. Bras. iii. pt. 3, 373 (1892), and in Engler, Pflanzenr. iv. Fam. 32, 166 (1935). *Ae. pulchra* (Beer) Mez in Mart. Fl. Bras. iii. pt. 3, 374 (1892), and in Engler, Pflanzenr. iv. Fam. 32, 168 (1935). *Ae. eriostachya* Ule in Engler, Bot. Jahrb. xlii. 197 (1908). *Ae. ellipsoidea* Rusby in Mem. N. Y. Bot. Gard. vii. 212 (1927).

BRITISH HONDURAS: El Cayo District, Mountain Pine Ridge, 1931, *Bartlett Bartlett 13053* (G, Mich). GUATEMALA: Peten: Uaxactun, 1931, *Bartlett 12338, 12786* (Mich); Yaxha-Remate Road, 1933, *Lundell 4275* (Mich). TRINIDAD: Cabacera de Aripo, 1869, *Herb. Trin. 2002* (Trin); 1873, *Herb. Trin. 698* (Trin); Arima, 1874, *O. Kuntze 988* (NY); Carapichaima, 1892, *Alexander 5723* (G, Trin); St. Andrew: Balandra, 1922, *Freeman 10505* (Trin, phot. G); near the Quare Reservoir, via Valencia, 1933, *Broadway* (G). VENEZUELA: Distrito Federal: vicinity of Caracas, 1935, *H. Pittier 13653* (US); Aragua: near Colonia Tovar, 1854–5, *Fendler 1352* (G). BOLIVIA: La Paz: near Asunta, second Bopi Camp, alt. 850 m., 1921, *O. E. White 633* (NY, type of *Ae. ellipsoidea;* phot. G). FRENCH GUIANA: *Martin* (BM, type; phot. G); *Poiteau* (K). BRITISH GUIANA: without further locality, *Schomburgk 1025* (K); Demerara: upper Demerara River, 1887, *Jenman 4056* (K, hb. Jenman), *4153* (NY); Berbice: Maperma Creek, Corentyne River, Sept. 1879, *im Thurn* (K); Essequibo: Kamakusa, upper Mazaruni River, 1922, *Leng 385* (NY). BRAZIL: Pará: upper Cupary River, plateau between the Xingu and Tapajos Rivers, 1931, *Krukoff 1222* (G, NY); Bahia: low woods near Maracas, 1906, *Ule 7028* (B, type of *Ae. eriostachya;* phot. G); near Toca da Onca, 1915, *Rose & Russell 20108* (US, phot. G); Ouro Branco, 1937, *Castellanos* (G, BA 20585); São Paulo: epiphytic in forest, Campinas, 1875, *Mosén 3929* (S, phot. G); Pinheiros, 1885, *Loefgren* (SP 12348, phot. G); Butantan, 1924, *Gehrt* (SP 13179, phot. G); Cidade Jardim near São Paulo, alt. ca. 800 m., *Smith & Kuhlmann 1801* (G); Paraná: Serrinha, 1908, *Dusén 7024* (S, phot. G); Jaguariahyva, 1910, *Dusén 10779* (S); 1914, *Dusén 15446* (S), *16072* (G, S); 1915, *Dusén* (S); Goyaz or Matto Grosso: between Goyaz and Cujaba, 1844, *Weddell* (P); Matto Grosso: Guia, 1894, *Lindman A 3521½* (S, phot. G); São Luiz de Caceres, 1908, *Hoehne 439* (Mus. Nac. Rio, phot. G). PARAGUAY: epiphytic, Cosme, between Villa Rica and Caaguazu, 1876, *Balansa 706* (P); Cordillera de Peribébuy in the valley of the Chololo, 1883, *Balansa 4748* (P, phot. G); Pirapó, 1893, *Lindman A 1893* (S, phot. G); El Chaco, by Riacho Negro, 1893, *Lindman A 2155* (S, phot. G); Villa Rica, 1928, *Jörgensen 3961* (Dudley Hb.). ARGENTINA: Misiones: Posadas, 1907, *Ekman 1211* (S, phot. G).

The above material has been the basis of my decision to reduce *Aechmea tinctoria, pulchra, eriostachya* and *ellipsoidea* to the synonymy

of *Ae. bromeliaefolia*. In his treatment of the subgenus *Macrochordion* in both the Monographiae and the Pflanzenreich, Mez makes his primary division on whether the sepals are free or connate. Yet all of his cited material that I have examined shows the sepals slightly connate. A better character probably is the thick bicarinate floral bracts of *Ae. bromeliaefolia*, as opposed to the flat thin bracts of *Ae. Lamarchei*, *lagenaria* and *alba*. Other distinguishing characters used were: color of the petals, height of insertion of the petal-appendages and size of the leaf-spines. No attempt was made to place *Ae. ellipsoidea* exactly.

Ae. eriostachya with "Petala lutea, in 1/5 longitudinis ligulata" is contrasted with *Ae. bromeliaefolia* with "Petala e sordide pallido nigrescentia, in 1/3 longit. ligulata." Yet in the type of *Ae. eriostachya* the flowers have dried as black as in typical *Ae. bromeliaefolia*, while the label of *Balansa 4748*, cited under *Ae. pulchra*, gives an intermediate case with the note: "Corolle d'un jaune verdâtre, puis noire." In short the fresh petals in *Ae. bromeliaefolia* in the broad sense are white to yellow, turning black with varying rapidity. The variation in the height of insertion of the petal-appendages might be of varietal significance in the unlikely event of its proving constant, but it is hardly of specific value.

The size of the leaf-spines varies greatly on a single plant and is of practically no significance.

The stations for *Ae. bromeliaefolia* in British Honduras and Guatemala constitute a tremendous range extension for the species and show it as one of the most wide-spread of all the *Bromelioideae*.

Aechmea subpetiolata, spec. nov., florifera ca. 4 dm. alta; foliis plus quam 6 dm. longis, vaginis parvis, ellipticis, inconspicuis, laminis anguste ellipticis, late acutis apiculatisque, ad basin versus valde angustatis subpetiolatisque, 75–85 mm. latis, ex sicco submembranaceis, supra glabris, subtus dense adpresseque argenteo-lepidotis, basi apiceque minutissime serrulatis; scapo erecto, gracili; scapi vaginis erectis, dense imbricatis, anguste lanceolatis, acuminatis, integris, viridibus, subtus argenteo-lepidotis; inflorescentia simplicissima, dense subcylindrica, 6 cm. longa, fere 4 cm. diametro, fructifera valde incrassata, apice coma parva aucta; bracteis florigeris anguste triangularibus, pungentibus, ad 12 mm. longis; floribus sessilibus; sepalis perasymmetricis, ca. 1 cm. longis, in spinulam brunneam patentem ad 4 mm. longam productis, dissite albido-lepidotis; petalis ligulatis, alte obtusis apiculatisque, quam sepala paulo longioribus, squamis magnis instructis; ovario ellipsoideo; placentis interno loculorum angulo prope apicem affixis. Pl. III.

COLOMBIA: Cauca: El Tambo region in primaeval forest near La Costa, alt. 1500 m., March 1938, *Kjell von Sneidern 1593* (S, TYPE; phot. G).

In Mez's key to *Aechmea* in the Pflanzenreich, this species runs down to the vicinity of *Ae. Pineliana*, but differs from it and all its relatives in having subentire subpetiolate leaf-blades. In spite of its entire scape-bracts, it is probably more nearly related to *Ae. Fraseri* than to *Ae. Pineliana*.

Neoregelia Carolinae (Beer), comb. nov. *Bromelia Carolinae* Beer, Brom. 29 (1857). *Aregelia Carolinae* (Beer) Mez in DC. Mon. Phan. ix. 74 (1896).

Neoregelia compacta (Mez), comb. nov. *Nidularium compactum* Mez in Mart. Fl. Bras. iii. pt. 3, 235 (1891). *Aregelia compacta* (Mez) Mez in DC. Mon. Phan. ix. 73 (1896).

Neoregelia concentrica (Vell.) L. B. Smith. *Karatas coriacea* Ant. Phyto-Iconogr. 51, t. 30, fig.1 (1884). *Aregelia coriacea* (Ant.) Mez in DC. Mon. Phan. ix. 77 (1896). *Nidularium Laurentii* Regel in Ind. Sem. Hort. Petrop. 1866. 80 (1867), and in Gartenfl. xvi. 1, t. 529 (1867). *Aregelia Laurentii* (Regel) Mez in DC. Mon. Phan. ix. 80 (1896).

Aregelia coriacea and *A. Laurentii* are not separable from *Neoregelia concentrica* on any characters stable enough to justify specific distinction.

Neoregelia cruenta (R. Graham), comb. nov. *Bromelia cruenta* R. Graham in Edinb. Phil. Journ. 174 (1828). *Aregelia cruenta* (R. Graham) Mez in DC. Mon. ix. 71 (1896).

Neoregelia cyanea (Beer), comb. nov. *Hoplophytum cyaneum* Beer, Brom. 131 (1857). *Aregelia cyanea* (Beer) Mez in DC. Mon. Phan. ix. 67 (1896).

Neoregelia farinosa (Ule), comb. nov. *Nidularium farinosum* Ule in Bericht Deutsch. Bot. Gesellsch. xviii. 319 (1900). *Aregelia farinosa* (Ule) Mez in Engl. Pflanzenr. iv. Fam. 32, 42 (1934).

Neoregelia indecora (Mez), comb. nov. *Aregelia indecora* Mez in Fedde, Rep. Spec. Nov. xvi. 3 (1919).

Neoregelia leucophaea (Bak.), comb. nov. *Karatas leucophaea* Bak. Brom. 7 (1889). *Aregelia leucophaea* (Bak.) Mez in DC. Mon. Phan. ix. 77 (1896).

Neoregelia longebracteaea (Mez), comb. nov. *Nidularium longebracteatum* Mez in Mart. Fl. Bras. iii. pt. 3, 239 (1891). *Aregelia longebracteata* (Mez) Mez in DC. Mon. Phan. ix. 79 (1896).

Neoregelia macahensis (Ule), comb. nov. *Nidularium macahense* Ule in Bericht Deutsch. Bot. Gesellsch. xviii. 318 (1900). *Aregelia macahensis* (Ule) Mez in Engl. Pflanzenr. iv. Fam. 32, 45 (1934).

Neoregelia Makoyana (Regel), comb. nov. *Nidularium Makoyanum* Regel in Gartenfl. xxxvi. 656 (1887). *Aregelia Makoyana* (Regel) Mez in Engl. Pflanzenr. iv. Fam. 32, 50 (1934).

Neoregelia marmorata (Bak.), comb. nov. *Karatas marmorata* Bak. Brom. 11 (1889). *Aregelia marmorata* (Bak.) Mez in DC. Mon. Phan. ix. 76 (1896).

Neoregelia olens (Hook. f.), comb. nov. *Billbergia olens* Hook. f. in Bot. Mag. xci. t. 5502 (1865). *Aregelia olens* (Hook. f.) Mez in Engl. Pflanzenr. iv. Fam. 32, 42 (1934).

Neoregelia rubrospinosa (Mez), comb. nov. *Nidularium Laurentii* var. *immaculatum* Regel in Gartenfl. xxxiv. 243 (1885). *Aregelia rubrospinosa* Mez in Fedde, Rep. Spec. Nov. xii. 412 (1913).

The above combinations complete the necessary transfers from *Aregelia* Mez, non O. Kuntze, to *Neoregelia*. *Aregelia Marechali* Mez has not been transferred, because it did not seem of specific value under either of the two interpretations given it. In De Candolle's Monographiae, ix. 76, on the basis of Morren's unpublished plate and supposedly authentic living material at Liége and Leyden, Mez treats it as a form of *Aregelia princeps* describing its leaves as "saepius subtus ± pulverulento-lepidotis." Yet in the Pflanzenreich, iv. Fam. 32, 43, apparently on the basis of recent living material from Berlin, he raises it to a species, characterizing the leaves as "utrinque glabra laete viridia, praesertim subtus nitidula." This change is significant because it shifts *Aregelia Marechali* in his Pflanzenreich key from the vicinity of *A. princeps* to that of *A. Carolinae*. From the above it is concluded that the material from Berlin was not exactly the same form as the original *A. Marechali*, and that the original is not distinct from *A. princeps*. Further, the Berlin material from its description does not appear specifically separable from *A. Carolinae*.

Aregelia Burchellii and *A. microps* are more logically left in *Nidularium* where Mez originally had them and consequently are not transferred here. In their subsessile flowers and compound inflorescences they agree much better with *Nidularium* than with *Neoregelia*. Mez placed them with *Aregelia* on the basis of their acute spreading petals, and they do differ from most species of *Nidularium* in this character. Yet there are intergrades, as witness figure 16 in Family 32 of Das Pflanzenreich, and the two species while they might still be kept as a subgenus, much more properly belong under *Nidularium*.

Aregelia myrmecophila has a compound inflorescence, coriaceous floral bracts, and subsessile flowers. It is not certain where it belongs but it does not seem that it should be included in *Neoregelia*.

Tillandsia (subgenus **Phytarrhiza**) **Maxoniana**, spec. nov., acaulis, florifera paulo ultra 4 dm. alta; foliis rosulatis, ad 55 cm. longis; vaginis ellipticis, 9 cm. longis, laevibus, pallide brunneis, obscure lepidotis; laminis lingulatis, acutis, 2 cm. latis, planis, supra glabris, subtus obscure lepidotis; scapo erecto, gracili; scapi vaginis erectis, ellipticis, acuminatis vel apiculatis, quam internodia paulo longioribus; inflorescentia simplicissima, laxe pauciflora, 11–12 cm. longa, valde complanata, glabra; rhachi gracili, angulata, leviter flexuosa; bracteis florigeris 12 mm. distantibus, divergentibus et maturitate nullo modo imbricatis, ellipticis, acutis, ad 45 mm. longis, sepala subaequantibus, carinatis, incurvis, subcoriaceis, leviter nervatis; floribus breviter pedicellatis; sepalis anguste ellipticis, acutis, 4 cm. longis, subcoriaceis, liberis; petalis valde imperfecte cognitis; staminibus stylum subaequantibus, profunde inclusis. Pl. II, fig. 1–3.

BOLIVIA: La Paz: Nor Yungas: subtropical region, Polo-Polo, near Coroico, alt. 1100 m., 1912, *Buchtien 4538* (US, TYPE; phot. G).

The key in the Pflanzenreich takes this species to the vicinity of *T. cornuta*, but except for its simple lax inflorescence it seems more nearly related to the group of species about *T. pretiosa*. It differs from the latter in its ligulate leaves also.

It is a pleasure to name this species after Dr. W. R. Maxon whose help has contributed greatly to my studies of the *Bromeliaceae*.

Vriesia amazonica (Bak.) Mez in Mart. Fl. Bras. iii. pt. 3, 554 (1894). *Tillandsia gigantea* Mart. ex R. & S. Syst. vii. 1224 (1830). *T. amazonica* Bak. in Jour. Bot. xxvi. 108 (1888). *Vriesia gigantea* Mez in Mart. Fl. Bras. iii. pt. 3, 566 (1894), and in Engler, Pflanzenr. iv. Fam. 32, 402 (1935), non Gaud. (1846).

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4. A NEW SPECIES OF DESMODIUM FROM PERU.

By Bernice G. Schubert.

From a recent collection of plants made by Dr. César Vargas of the Universidad de Cuzco, Peru, an extremely interesting *Desmodium* was referred to me by Dr. Lyman B. Smith. This plant agrees with a small number of other collections from Peru which, together, form a distinct entity, apparently undescribed.

Desmodium (§ Heteroloma) **Vargasianum** sp. nov. (Tab. I, fig. 1–5). Subscandens, caule simplice, striato, dense canescente; pilis adpressis vel patentibus 0.4–0.5 mm. longis: foliis trifoliolatis, petio-

latis: petiolis angulatis, 1.4–2.7 cm. longis, ut caulis canescentibus: petiolulis 0.2–0.4 cm. longis: foliolis mucronatis, crassis, supra puberulis atro-viridibusque, subtus pallidioribus, et dense hirsutis, venis reticulatis prominulis; foliolo terminale 2.5–7.3 cm. longo, 0.6–4.0 cm. lato, elliptico-ovato vel oblongo, basi subcordato vel obtuso, apice obtuso vel subacuto; foliolis lateralibus 2–6 cm. longis, 2.7 cm. latis, oblongo-ovatis, basi subcordatis, apice subacutis: stipulis 0.6–1.2 cm. longis, ovato-acuminatis basi subamplectantibus, apice longe attenuatis, marginibus albo-ciliatis: stipellis 0.4–0.8 cm. longis, subulatis, albo-ciliatis, plerumque deciduis: racemo simplicissimo, terminale, subdenso: rhachi striata, pilis uncinato-hispidulis fulvis vestita: bracteis striatis, ovatis, apice longe attenuatis et basi truncatis, supra basem dilatatis, ciliatis et pagina dorsali medio pubescente, pilis aureis, deciduis ante florum maturitatem: pedicellis 0.6–1.4 cm. longis (flore vel fructu maturo), sparse pubescentibus, pilis longis patentibus et pilis brevibus densis intermixtis: floribus maximis, ante anthesin (clausis) 1.25 cm. longis; post anthesin (apertis) 1.3 cm. longis: calice pilis longis patentibus praecipue in nervis marginibusque vestito; tubo circa 0.2 cm. longo, dente centrali lobi inferioris 0.3–0.5 cm. longo; lobo superiore bifido 0.3 cm. longo: corolla caerulea; vexillo magno, 1.2–1.4 cm. longo; alis 1.1–1.35 cm. longis; carina alis aequante: lomento ad 4 cm. longo, stipitato, stipite 0.3–0.5 cm. longo, sutura inferiore subrhombea et maiore profundius quam superiore constricto, articulis quattuor vel sex, 0.6 cm. longo, 0.4 cm. lato, pilis fulvis uncinatis hispidulisque pubescente.

PERU: Dept. Apurimac, prov. Abancay, vicinity of Abancay, alt. 2400 m., January 1938, *C. Vargas* no. 769 (TYPE in Gray Herb.). Dept. Ayacucho, Ccarrapa, between Huanta and Río Apurimac; alt. 1500 m., wooded hillside, May 1929, *Killip & Smith*, no. 22415 (U. S. National Herbarium, N. Y. Bot. Gard.); Pampalca, between Huanta and Río Apurimac; alt. about 3200 m., open hillside, May 1929, *Killip & Smith*, no. 22265 (U. S. National Herbarium, N. Y. Bot. Gard.).

Desmodium Vargasianum belongs to that group of species in which the type of pubescence on the stem differs completely from that of the raceme; *D. strobilaceum* Schlecht. and *D. sericophyllum* Schlecht. are similar in this respect. *D. Vargasianum* differs from these two species, however, in its very large flowers; its stouter, longer pedicels which never become completely deflexed; in the aureous ciliation of the bracts, a striking contrast to the white ciliation of the stipules; and in the elliptic- or oblong-ovate leaflets which are not tomentose beneath as in *D. sericophyllum*. From *Desmodium Asparines* (Link) DC., with

which some of the cited material has been identified, *D. Vargasianum* differs in its subscandent habit, its subcoriaceous, very prominently reticulate leaflets (those of *D. Aparines* are more nearly chartaceous), its densely canescent stem (that of *D. Aparines* is uncinate-hirsute throughout) and in its smaller flowers and loment-joints.

It should be noticed in the illustrations that the calyx figured with the loment is measurably smaller than that of the mature flower. This is so because the calyx withers in age and is usually quite shrunken when the fruit becomes mature.

The author is indebted to Dr. Wm. R. Maxon of the United States National Herbarium and Dr. H. A. Gleason of the New York Botanical Garden for the generous loan of specimens, and to Miss Shirley Gale who drew the plate.

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5. ON CERTAIN TYPE SPECIMENS IN FERNS.

By C. A. Weatherby.

1. Further Types of Desvaux's Species

During the summer of 1937 I had opportunity to search further for Desvaux's types in the herbarium at Paris and to restudy some seen before. As I had anticipated, several more were found; a still more prolonged search would doubtless disclose yet others.

Those found in 1937 are here reported upon. The form of my previous paper[1] is followed. As there, Desvaux's name is in all cases placed first and after it necessary synonymy, with the accepted name in small capitals. Except in special cases, only dates of publication are given. With Desvaux, 1811 refers to his paper "Observations sur quelques nouveaux genres de fougères et sur plusieurs espèces nouvelles de la même famille" in der Gesellschaft Naturforschender Freunde zu Berlin Magazin v. 297–330, t. VII, f. 4–7; 1813 to the translation of that article, with some additions, in Journal de Botanique appliquée iii; 1827 to "Prodrome de la famille des fougères" in Mémoires de la Société Linnéenne de Paris vi. 171–337. Two corrections in the nomenclature of my previous article are included.

I am much indebted to the authorities of the Muséum d'Histoire Naturelle at Paris for the privilege of consulting the rich collections there and especially to M. Metman for many helpful courtesies.

[1] On the Types of Desvaux's American Species of Ferns. Contr. Gray Herb. cxiv. 13–35 (1936).

Acrostichum luteum Desvaux (1827). PITYROGRAMMA AUREA (Willd.) C. Chr. *Hemionitis aurea* Willd. (1810). *Notholaena lutea* (Desv.) Moore.—Restudy of Desvaux's type shows that it is neither a *Notholaena*, as I at first supposed, nor a *Pellaea*, as positively stated (I know not on whose authority) in the Index Filicum, but a *Pityrogramma*. It agrees with no American species known to me, but in all minute characters with *P. aurea* of Madagascar. It is quite unlike that species, however, in its small and narrow fronds with reduced lower pinnae. I could find no other sheet at Paris from which Desvaux's fragmentary and wretchedly prepared material could have been taken. In view of the impossibility of referring it to any American species, there seems a strong probability that the ascription of it to South America is erroneous and that it really came from one of the early French collections in the Mascarenes. Because of the resemblance in detail I am referring it, hesitantly, to *Pityrogramma aurea*.

Acrostichum tereticaulon Desv. (1811). NOTHOLAENA FLAVENS (Sw.) Moore. *A. flavens* Sw. (1806).—Desvaux himself made this reduction in his Prodrome (p. 212) and on his herbarium-label. There he also anticipates Moore in referring the species to *Notholaena*, but seems never to have published on this point.

Adiantum rotundatum Desv. (1827). A. CHILENSE Kaulf. (1824) ?—A specimen of *A. chilense* in herb. Paris, labelled "Peru, Dombey" and accompanied by a tiny slip on which is written in Desvaux's hand "espèce que j'ai decrite," perhaps represents this species, though hardly to be taken as the actual type.

Asplenium denticulosum Desv. (1811).—The type is sheet no. 1263 in the Jussieu herbarium. As Alston has reported,[1] the specimen is *Diplazium cristatum* (Desr.) Alst.

BLECHNUM BRASILIENSE Desv. (1811).—The type is sheet no. 1390 in the herbarium of Jussieu. The current interpretation of the species is correct.

Cystopteris orientalis Desv. (1827). MICROLEPIA SPELUNCAE (L.) Moore. *Polypodium speluncae* L. (1753).—Here, as in the case of *C. jamaicensis*,[2] it is easy to see how the apparently lateral indusium led Desvaux to refer his species to *Cystopteris*, but hard to understand how anyone who had read his description, calling for "frondibus . . . sparse pilosiusculis; soris . . . margine sursum laciniarum; rachi hirto-pilosa," could have supposed it synonymous with *C. fragilis*. Yet it has been so referred, one writer following another, at least since Moore's Index and probably earlier.

[1] Journ. Bot. lxxxiv. 173 (1936).
[2] Vide Contr. Gray Herb. cxiv. 22 (1936).

Desvaux's specimen has the rachis and the costae above pubescent with short, soft, weak, articulated hairs. Rachis, costae, costulae, and veins beneath bear stiff, scattered, pointed, white, also articulated hairs.

Davallia magellanica Desv. (1811). D. SOLIDA (Forst.) Sw. *Trichomanes solidum* Forst. (1786).—The type is sheet no. 1950 in the herbarium of Jussieu. Desvaux himself in his Prodrome reduced *D. magellanica* to *Humata solida*, as he called it, and on his label corrected the habitat to something which I cannot make out, but which is plainly not America.

It may be noted that the rather numerous cases in which Desvaux gave wrong habitats were apparently not due to his own carelessness. He seems faithfully to have copied data from the original labels of the specimens he saw; the labels themselves were wrong. In particular a considerable number of Commerson's plants from Polynesia were somehow, as in this case, recorded as from the Straits of Magellan.

Dicksonia Millefolium Desv. (1827). DENNSTAEDTIA DISSECTA (Sw.) Moore. *Polypodium dissectum* Sw. (1788), (not Forst. (1786), but validated by Swartz's transfer to *Dicksonia* in 1801).—Desvaux's published habitat is "India orientalis"; on his label, however, he placed a question-mark after it. His specimen is the more finely dissected phase of the American *Dennstaedtia dissecta*.

Gymnogramma chaerophylla Desv. (1811). ANOGRAMMA CHAEROPHYLLA (Desv.) Link.—The type is sheet no. 1033 in the herbarium of Jussieu. The current application of the name is correct.

Hemionitis brasiliana Desv. (1827). ANTROPHYUM BRASILIANUM (Desv.) C. Chr.—Desvaux's type exists and I have now seen it. The name is correctly applied to the species afterward described as *A. subsessile* Kze.

Hemionitis gigantea Desv. (1827). ANTROPHYUM GIGANTEUM Bory (1833). *A. Desvauxii* Moore (1858).—Desvaux's published description gives "insula Sancti-Thomae Antillarum" as the habitat of this species. On his label, however, he has erased this and substituted "Borbonia." The specimen is *A. giganteum* Bory of the Mascarene Islands. Bory, in publishing his species, made no mention of Desvaux, but may have been transferring the latter's name. Moore, misled, perhaps, by Bory's lack of reference to Desvaux and by the erroneous habitat given for *Hemionitis gigantea*, supposed it to be a distinct American species and transferred it to *Antrophyum* as *A. Desvauxii*, changing the specific epithet because of *A. giganteum* Bory. It appears, under Moore's name, as a species dubia of the West Indies in the Index Filicum.

Lomaria magellanica Desv. (1811). Blechnum tabulare (Thunb.) Kuhn. *Pteris tabularis* Thunb. (1800). *Blechnum magellanicum* (Desv.) Mett. (1856).—The type is sheet no. 1371 in the Jussieu herbarium. The species is correctly referred to *B. tabulare* sens. lat., but should the American plant be segregated from the African, Desvaux's epithet must apparently be used for it.

Mertensia squamulosa Desv. (1813). Gleichenia squamulosa (Desv.) Moore. *M. pedalis* Kaulf. (1824). *G. pedalis* (Kaulf.) Spreng. (1827). *Dicranopteris pedalis* (Kaulf.) Looser (1936). Reëxamination leaves no doubt in my mind that *Mertensia squamulosa* Desv. and *M. pedalis* Kaulf. are conspecific. Desvaux's specimen is well matched, in size as well as in other respects, by several Chilean specimens at Paris. His epithet must be taken up for the species.

Nephrodium Kunthii Desv. (1827). Dryopteris patens (Sw.) Ktze. *Polypodium patens* Sw. (1788).—Desvaux gave no original description but based his species wholly on "Aspidium patens Kunth excl. syn." A specimen in the Humboldt herbarium labelled *A. patens* "Cumanacoa, Caripe" (two of the localities given by HBK.) is therefore to be taken as type. It is apparently good *Dryopteris patens*. The single pinna in Desvaux's herbarium is very similar and may have come from it. Nothing, indeed, is obviously missing from it as it is, but the rachis has been cut above the lower two pairs of pinnae and a portion apparently removed in order to make the blade fit better on the mounting sheet. From this removed portion Desvaux's fragment might have been taken.

Nephrodium Poiretii Desv. (1827). Dryopteris patens (Sw.) Ktze. *Polypodium patens* Sw. (1788).—Desvaux cited in synonymy "Polypodium pubescens Poir. . . excl. syn." and on his label wrote "habitat in Martinica in herb. Lam." A specimen in the Lamarck herbarium labelled, probably in Lamarck's hand, "de la Martinique la Barrère" and "Polypodium pubescens Dict." in Poiret's, may be taken as type.

It consists of the upper half of a badly damaged lamina from which a pinna has been removed. The upper surface has a peculiar whitish appearance. Desvaux's also damaged pinna agrees perfectly with this specimen and no doubt is the missing one. His description fits it; in the manuscript diagnosis attached to his herbarium sheet he even notes the whitish upper surface, though, in publishing, he omitted this detail. Dr. Christensen has seen the specimen and has labelled it *Dryopteris patens*.

My foreboding that these two *Nephrodia* of Desvaux might prove

to have anticipated more recent segregates from *D. patens*[1] was happily unfounded. The specimen from Jamaica which Desvaux labelled *N. patens* in his herbarium is a much more developed plant than either of the others, with long-linear, more gradually acuminate pinnae. *N. Poiretii* was described from a small, damaged and perhaps pathological individual; *N. Kunthii*, a plant of moderate development, falls between. None of the specimens has a rootstock or even a stipe-base, so that their determination is not altogether certain. But Christensen's judgment certainly ought to be accepted for *N. Poiretii;* and *D. patens* is not only the most probable determination for *N. Kunthii* on morphological grounds, but also the most reasonable for an individual coming from a region where, in its immediate group, only *D. patens* is known.

Ophioglossum pedunculosum Desv. (1811). *O. fibrosum* Schumach. (1827).—This determination was made by Dr. R. T. Clausen, whose monograph of *Ophioglossaceae* has just appeared, from my photograph and notes; its correctness is, I think, beyond question. The habitat South America, which Desvaux himself questioned, proves to be quite wrong.

Polypodium articulatum Desv. (1827), non (Sw.) Juss. ex Poir. (1804). P. Caceresii Sod. (1893).—In my previous paper Desvaux's name was inadvertently marked as that to be accepted. Being a later homonym of *P. articulatum* (Sw.) Juss. it cannot, of course, stand; my entry should have read as above.

Polypodium Kunthii Desv. (1827). P. rosmarinifolium Kunth (1822).—I was mistaken in saying that Desvaux's type was not *P. rosmarinifolium;* perhaps if I had said it was not the plant passing in American herbaria as that species I should have been more nearly correct. Actually it is not only *P. rosmarinifolium* but may well have been cut from the tip of Kunth's type specimen in the Humboldt herbarium. Both Kunth and Desvaux based their species on *P. lycopodioides* sensu HBK. Nov. Gen. & Sp. i. 6 (1815) and drew their diagnoses largely from that work. Kunth cites "P. Kunthii Devaux mss.?" in synonymy. Either Desvaux had not seen Kunth's publication, which he does not cite, or he preferred to maintain his own name.

Lehmann 4586, from Ecuador, cited by Hieronymus as *P. rosmarinifolium* and other specimens which, following him, have been referred to that species, differ from Desvaux's and Kunth's types in their acute fronds with slender, quite unmargined stipes. In the Kunth plant the lamina is obtuse and tapers at base into a broadly margined, scarcely distinguishable stipe.

[1] Contr. Gray Herb. cxiv. 29 (1936).

Pteris acuminata Desv. (1811). P. PUNGENS Willd. (1810).—The type, missed by me in 1935, is in the general herbarium at Paris with duplicates in the herbaria of Jussieu and Lamarck. It is correctly referred to *P. pungens*. Desvaux knew of Willdenow's species but considered his own plant distinct.

PTERIS CHILENSIS Desv. (1811).—The current interpretation of the species is correct.

Pteris pectinata Desv. (1811). P. QUADRIAURITA Retz. (1791)? *P. plumula* Desv. (1827).—In its broad-based pinnae, its venation, and most details Desvaux's specimen seems to belong with *P. quadriaurita*. The lamina has, however, the (possibly injured) apex ending in a pair of pinnae instead of the usual single terminal one; and what are apparently the basal pinnae quite lack the elongate lobe on the lower side characteristic of *P. quadriaurita*. It might be guessed that the actual basal pinnae had been broken off; but if so the scar is so concealed by the folding over of the specimen in pressing as to escape my observation; and it also escaped Desvaux's. In his manuscript notes attached to the sheet he particularly comments on the absence of the elongate lobes.

Pteris reticulata Desv. (1811). P. DENTICULATA var. BRASILIENSIS (Raddi) Baker. *P. brasiliensis* Raddi (1819).—Desvaux's type, collected in Brazil by Dombey, is sheet no. 1301 in the herbarium of Jussieu. Desvaux in the Prodrome identified his species with *P. brasiliensis*, properly retaining his own earlier name, which is correct if the Brazilian plant is kept separate from *P. denticulata*.

Pteris siliculosa Desv. (1811). ONYCHIUM SILICULOSUM (Desv.) C. Chr.—This turns out to be the Asiatic species to which the name is now usually applied, with incorrect data of locality, not, as I had suspected it might be, *Pellaea fumariaefolia* of Chile.[1]

Pteropsis vittarioides Desv. (1827). VITTARIA RUIZIANA Fée (1851–52). *V. vittarioides* (Desv.) Weath. (1936), non (Thouars) C. Chr. (1907).

Salvinia affinis Desv. (1827). S. NATANS (L.) All. *Marsilea natans* L. (1753).—Desvaux's species was referred to *S. auriculata* by Kuhn, whose annotation-label to that effect is on the type sheet. He seems to have been followed by everyone, including Herzog, the latest monographer of the genus. Desvaux's specimen looks unlike the usual run of *S. natans;* it differs therefrom, as he states, in its large, emarginate and rather more hispid floating leaves. It is well matched, however, by various specimens from eastern Asia which, like it, have

[1] Contr. Gray Herb. cxiv. p. 34 (1936).

the technical characters of *S. natans*. Kuhn's determination was perhaps unconsciously influenced by Desvaux's citation of "S. natans Kunth excl. syn." and his geographic data. It may be significant that, although in the Prodrome Desvaux confidently gave "Cuba Hispaniolaque" as the habitat of his species, on his label he gave only "America" and that above the label on the type sheet is a small slip reading "America? S. affinis Desv."

2. Acrostichum lanuginosum Willd. and Pteris aurea Poir.

Acrostichum lanuginosum Willd. Schrift. Akad. Erfurt, 1802: 31, t. 3, f. 4; non Desf. (1800). *A. scariosum* Sw. Syn. Fil. 16 (1806). Cheilanthes scariosa (Sw.) Presl, Rel. Haenk. i. 65 (1825), as to name-bringing synonym, not as to plant described, which is *Ch. myriophylla* Desv. *Notholaena scariosa* (Sw.) Baker in Mart. Fl. Bras. i. pt. 2, 540 (1870), as to name-bringing synonym and in part as to material included. *Ch. ornatissima* Maxon, Smithson. Misc. Coll. lxv. pt. 8, 3 (1915).

There is no specimen labelled *A. lanuginosum* in the Willdenow herbarium. There is, however, one labelled *A. scariosum* on the mounting sheet and placed in a species-cover on the outside of which the name *scariosum* is also written, over an erasure so thoroughly made that the original name is completely obliterated and the paper so scratched that Willdenow had to make two attempts before he could write the new name clearly. The cover-label also bears the diagnosis "fronde bipinnata foliolis reniformibus, squamis scariosis obtectis" which, except for the substitution of "subrotundis" for "reniformibus," is exactly the diagnosis of *A. lanuginosum* as published. This specimen agrees well with Willdenow's illustration except for the somewhat closer spacing of the pinnae[1] and the absence of an odd pinna with a small basal lobe figured in the plate on the left side. Since *A. scariosum* Swartz was a renaming of *A. lanuginosum* and Willdenow accepted the renaming in his edition of the Species Plantarum (v. 125 (1810)), there seems no doubt that he also accepted it in his herbarium and that this specimen, similar to the original illustration and accompanied by the original diagnosis, is the type of *A. lanuginosum* and therefore of *A. scariosum*. Willdenow's plate appeared in a rather rare publication; it is therefore reproduced here, in plate IV, with a photograph of the specimen for comparison.

[1] The artist might well have placed them farther apart for the sake of clearer delineation.

In its conspicuous tuft of castaneous, almost entire rhizome-scales, its narrow, inrolled pinnae and the copiously fibrillose scales of the lamina, their filaments and narrow tips covering the upper leaf-surface, the specimen clearly belongs with the species described as *Cheilanthes ornatissima* Maxon. In its apparently long stipe and relatively short, truncate-based lamina it is unlike the usual habit of this species, though rather long-stiped fronds do occur. Kuntze (Linnaea ix. 85) makes the observation that Willdenow's drawing represents a mutilated specimen. This also occurred, independently, to me. The Willdenow specimen shows, indeed, no obvious evidence of mutilation; but scars of broken-off pinnae might be concealed by the dense covering of scales on the rachis, and one pinna seems to have disappeared even since the illustration was made.

A second specimen (of *Cheilanthes myriophylla* Desv.) is in the cover of *A. scariosum;* but since it does not at all agree with Willdenow's plate, it cannot be taken as type.

For the sake of completeness and of the instruction as to what not to do which may be drawn from it, the nomenclatural history of the species may be briefly summarized. Willdenow not only gave it an untenable name and, as noted above, figured a seemingly aberrant or injured specimen, but recorded it as from Mexico, where it is not known. Swartz, finding Willdenow's name preoccupied, substituted *A. scariosum*, citing *A. lanuginosum* as a synonym, taking his diagnosis and other data directly from Willdenow and drawing his epithet from the latter's description. Presl, who saw Willdenow's material, transferred the species to *Cheilanthes*, using Swartz's epithet and duly citing the Swartzian and Willdenovian synonyms, but applying the name to the group represented by the second of the two specimens above mentioned, that is, *Cheilanthes myriophylla* Desv. Kunze, Linnaea ix. 85 (1835), Hooker, Sp. Fil. ii. 99 (1858), and Mettenius, Cheil. 34 (1859), applied the name correctly and Hooker figured a much more typical specimen than that of Willdenow. Baker, in Mart. Fl. Bras. i. pt. 2, 540 (1870), transferred the name to *Notholaena* and applied it to an extraordinary collection of species including *N. peruviana* Desv. (*N. Brackenridgei* Baker), *N. squamosa* (Gill.) Lowe and *N. brachypus* (Kze.) J. Sm.—and this, although two years before in the Synopsis Filicum he had used it correctly and had kept *N. squamosa* separate and continued this treatment in the second edition of the Synopsis in 1874! Christensen, in the Index Filicum, most unfortunately followed Baker's treatment in the Flora Brasiliensis rather than the better one in the Synopsis and also maintained

Cheilanthes scariosa Presl for a plant "certe non Acrostichum [s.] Sw.", although both Presl's and Baker's names were based on *Acrostichum scariosum* Sw. Finally, Maxon, misled by Baker's placing of the species in *Notholaena*, redescribed it as *Cheilanthes ornatissima*.

Pteris aurea Poir. Encycl. v. 710 (1804). *Acrostichum bonariense* Willd. Sp. Pl. v. 114 (1810). *Cheilanthes ferruginea* Willd. ex Link, Enum. Pl. Berol. ii. 463 (1822), not *Notholaena ferruginea* Desv., which is *N. trichomanoides* (L.) Desv.[1] *Notholaena rufa* Presl, Rel. Haenk. i. 19 (1825). N. AUREA (Poir.) Desv. Mém. Soc. Linn. Paris vi. 219 (1827). *N. ferruginea* (Willd.) Hook. Sec. Cent. Ferns sub t. 52 (1861), not *N. ferruginea* Desv. *N. bonariensis* (Willd.) C. Chr. Ind. Fil. 6 (1905), 459 (1906).

This species also has had a rather unfortunate nomenclatural history. It was independently described by Poiret under *Pteris*, by Willdenow under *Acrostichum* and by Link, from an herbarium name of Willdenow, under *Cheilanthes*. Presl added a wholly superfluous new name, *Notholaena rufa*, citing the two names of Willdenow (whose specimens he had seen) in synonymy with taxonomic, but by no means nomenclatural, correctness, and erroneously adding *N. tomentosa* and *N. ferruginea* Desv. Hooker, Sp. Fil. v. 108 (1864) pointed out the last error, but took up his own *Notholaena ferruginea*, founded on *Cheilanthes ferruginea* Willd. ex Link and unfortunately retained *N. tomentosa* Desv. as a synonym. This treatment was repeated in both editions of the Synopsis Filicum. Fournier, Mex. Pl. i. 120 (1872), working at Paris but presumably then not having access to Desvaux's herbarium, confused *N. ferruginea* Desv. with *N. ferruginea* (Willd.) Hook. and ascribed the name to the former author while applying it in the sense of the latter. D. C. Eaton, Ferns N. Amer. i. 297 (1879), followed him and subsequent American authors naturally followed Eaton until the publication of the Index Filicum. Hieronymus, on the basis of Hooker's synonymy, took up *N. tomentosa* Desv. as the earliest name, without mention of *Acrostichum bonariense* Willd., though this had been correctly cited in the synonymy of the species by Presl and the type was readily accessible at Berlin. Christensen, following Presl's synonymy, took up *A. bonariense* and transferred it to *Notholaena*.

[1] This combination is often attributed to Robert Brown, Prod. Fl. Nov. Holland 145 (1810), but, as indicated in the Index Filicum, he there merely stated that *Pteris trichomanoides* L. belonged in *Notholaena* and did not definitely make the combination. This was first done by Desvaux, Journ. Bot. Appl. i. 92 (1813).

All this furnishes an instructive example of what may happen to the name of an exceptionally well-marked and clear and, in addition, common and widely distributed species when type specimens are not, or cannot be, examined. No one seems ever to have thought of Poiret's name, though he had himself recorded that his type was in the herbarium of Jussieu, reasonably accessible at Paris at least since 1857, though his description at once suggests to anyone really familiar with the species the identity of his plant, and though Desvaux, who alone had seen the type, had given a plain hint by transferring Poiret's name to *Notholaena* and making no other provision for the well-known species concerned.

Poiret's type, consisting of six detached but perfectly recognizable fronds, is sheet no. 1333 in the herbarium of Jussieu.

I may add that I have seen the types of all the species here cited. To Mr. Alston of the British Museum, Prof. Dr. Diels of the Botanic Garden and Museum at Berlin, Dr. Klástersky of the National Museum at Praha, and to Dr. Maxon of the United States National Herbarium I am indebted for the privilege of examining specimens under their care and for generous aid in other ways.

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6. THE GROUP OF POLYPODIUM POLYPODIOIDES.

By C. A. Weatherby.

An attempt to determine the status and the correct nomenclature of the South American fern treated by Herter as a species under the untenable name *Polypodium minimum* (Bory) Hert. has led me to a study of the whole complex referred to *P. polypodioides* in the Index Filicum.

In 1916 Maxon (Contr. Nat. Herb. xvii. 585), in the course of his very excellent treatment of the American lepidote *Polypodia*, discussed variation in this species, noting that it was often regional and pointing out some significant characters, but concluding that segregation was scarcely justifiable. With one exception, this conclusion holds for segregation as species. However, an examination of the material at Kew (in citation of specimens abbreviated as K), the British Museum (BM), the Muséum d'Histoire Naturelle at Paris (P), the Gray Herbarium (G), and the United States National Herbarium (US) indicates that variation and range so far correspond as to make desirable the recognition of two species and four varieties. The

arrangement set forth below is therefore proposed. The characters common to the group are well stated in Maxon's treatment.

The ranges into which the American segregates for the most part fall—southeastern United States with a southwestward extension into Mexico; central Mexico and Central America; the West Indies, with extensions at low altitudes to southern Mexico, Central America and the northeastern coast of South America; southern Brazil, Paraguay, Uruguay and northern Argentina—are natural phytogeographic divisions which furnish boundaries for many groups of ferns. Indeed, the principal interest of this little investigation has been in the exactness of the relation between morphological difference and distribution which it has revealed. Only one variety shows a less usual range and even that is alone in its area.

All the segregates have attracted the attention of taxonomists in the past and all but two have received tenable epithets. Mettenius, for instance, kept *P. Eckloni* distinct and recognized three varieties of *P. incanum*, as he then called it. But working with scant material and without the geographic knowledge which we now have, and basing his arrangement wholly on venation, he failed to achieve a natural grouping.

Diels[1] and in his latest work Christensen[2] separate the scaly *Polypodia* as a distinct genus. But the presence or absence of scales on the lamina (the only character adduced by either author) in species otherwise similar would seem to be of no more significance than the presence or absence of any other foliar indument and to give an inadequate basis for generic segregation. Until other correlative characters are brought to light, it seems better to leave this group in *Polypodium*.[3]

The typification of *Acrostichum polypodioides* and the assigning of names to two of the segregate varieties are involved in a nomenclatural tangle of exasperating troublesomeness considering the minor importance of the groups concerned. I am no means wholly sure that I have unravelled it successfully; but here is my attempt.

Linnaeus had no specimen of *Acrostichum polypodioides* in 1753; later he acquired one, perhaps from Patrick Browne, and duly labelled it with that name. He first dealt with the species in Heiligtag's dissertation on *Acrostichum* (1745; p. 13). Here it rested on citations from Plukenet (t. 289, f. 1), Ray (later eliminated), and Morison (sect. 14, t. 3, f. 5). Plukenet's specimen was from Jamaica. I have seen it in the British Museum; it is the usual West Indian variant. Morison,

[1] Nat. Pflanzenf. i. pt. 4, 323 (1899).
[2] In Verdoorn, Man. Pteridology, 548 (1938).
[3] On this point, see Maxon, Contr. U. S. Nat. Herb. xvii. 557 (1916).

who seems to have been considerably impressed by this "species elegans," cited Plukenet, but provided a new phrase-name which he carefully ascribed to himself and a new illustration, and explicitly stated that he had received his specimen from Virginia. His material is preserved in the herbarium of Oxford University; it is, as it should be, the variety of the southeastern United States. In the first edition of the Species Plantarum, Linnaeus added citations from Gronovius and Sloane. I have seen the specimens on which they rest; they are, as would be expected, respectively the usual plants of the southeastern United States and of the West Indies.

These various citations are apparently the whole basis of the species. There is no indication that Linnaeus at any time worked with actual specimens before him. Everything in his diagnoses, from Heiligtag's dissertation to the second edition of the Species Plantarum, could have been drawn from the cited illustrations; the distinctive characters used to separate *A. polypodioides* and *A. ferruginosum* in Sp. Pl. ed. 2, p. 1525 were almost certainly taken from Plukenet's plate 89, figure 9 and plate 289, fig. 1. Linnaeus, then, seems to have drawn his treatment wholly from literature, consistently included two elements, here regarded as varietally distinct, cited illustrations of both,[1] and gave both Virginia and Jamaica as habitats.

It might be argued that *Clayton* 685, the specimen back of the Gronovian citation, has a preferred claim to the position of lectotype, since it is known that Linnaeus saw the Clayton collections. But he did not include the Gronovian reference in his first treatment of the species and there is no evidence that either it or the Clayton specimen played any part at any time in the construction of his diagnoses. Under the circumstances, with the two elements so evenly balanced, it seems entirely proper to choose a lectotype purely on grounds of nomenclatural convenience, if there is any such thing in this case. In order to determine it, four names have to be considered.

First comes *Acrostichum ferruginosum* L. Sp. Pl. ed. 2. 1525 (1763), which has usually been placed in the synonymy of *P. polypodioides*. There is no specimen of it in the Linnaean herbarium; it must rest on the two citations given—Plukenet, t. 89, f. 9 and Browne, Civ. Nat. Hist. Jamaica 105. As with *A. polypodioides*, Linnaeus' diagnosis may well have been drawn from Plukenet's figure; and, as noted above, the distinctive characters whereby he separates the two species —"pinnis . . . acutis . . . stipite laevi" for *A. ferruginosum*, "pinnis . . . obtusis . . . stipite squamosa" for *A.*

[1] Neither, as it happens, determinable without supporting specimens.

polypodioides—are almost certainly taken from this figure and plate 289, figure 1. Curiously enough, although Plukenet seems to have furnished the diagnosis, his phrase-name is cited, not directly, but from Browne, who misquoted it. Plukenet had under his pl. 89, fig. 9, "Filici-folia s. polypodium tenuifolium minus *Virginianum*" and the same in the corresponding text (Almagestum 133), except that "Filix" there appears in place of "Filici-folia." In Browne this phrase becomes "*Filici-folio* Polypodium *Ferruginosum minus*"; Linnaeus so quoted it and took his specific epithet from it.

There is no specimen at the British Museum to represent Plukenet's species and none of Browne is known to me. The latter's diagnosis is quite non-committal; but if really this species, his plant must have been the West Indian phase. Plukenet's figure, by itself, is hardly identifiable; but there is nothing in the southeastern United States except *P. polypodioides* which it could represent. It would appear, then, that *A. ferruginosum*, like *A. polypodioides*, contained two elements—the same two, if Browne's plant is correctly referred here. *A. ferruginosum*, in the absence of validating specimens, becomes either a *nomen dubium* or a direct synonym of *A. polypodioides*. In neither case, of course, can it be interpreted as a segregate.

The other three names are *P. incanum* Sw. Prod. Veg. Ind. Occ. 131 (1788), "P. velatum" Schk. Krypt. Gewächs. 188 (1809), and *P. ceteraccinum* Michx. Fl. Bor.-Am. ii. 271 (1803). All three are essentially renamings of *A. polypodioides*. Swartz substituted *P. incanum* on its transfer to *Polypodium*, quite justifiably in his time. Then and long afterward, the combination *P. polypodioides* ("the Polypodium-like Polypodium") was held to be inadmissible nonsense. Swartz, no doubt with West Indian material in hand, redefined the species, changing the Linnaean diagnosis somewhat, particularly to characterize more accurately the nature of the indument, and adding the citation from Patrick Browne given by Linnaeus under *A. ferruginosum*. But he cited *A. polypodioides* as a synonym and in the much more ample treatment in the Flora Indiae Occidentalis (iii. 1645–6), where he gave an excellent description of the West Indian plant, he also included the citations from Plukenet and Morison given by Linnaeus and covering the two elements of his species.[1] Finally, in the Synopsis Filicum, Swartz included also the two habitats, Virginia and Jamaica. It appears, therefore, that *Polypodium incanum* Sw., though somewhat broadened in scope, comprises *Acrostichum*

[1] Curiously enough, Swartz queried the Plukenet reference, which proves to apply indubitably to the West Indian plant, and emphasized as "bona" Morison's figure which represents the Virginian.

polypodioides in its entirety and is an exact synonym of it. Incidentally, Swartz's name is illegitimate, under present rules, as an unnecessary renaming of a species already validly and legitimately named.

"*P. velatum* Schk." appears only in the margin of p. 188 in this fashion: "*incanum. sub velatum.*" What this means, I do not know; but if it be taken as publication, *P. velatum* is obviously a renaming of *P. incanum* and doubly illegitimate. *P. ceteraccinum* is another renaming of *A. polypodioides*, no doubt for the same reason as Swartz's which is not cited. Michaux's diagnosis is original, but so generalized as to apply to all phases of *P. polypodioides*, though he refers only to North American material.

Although there is no possible doubt that Swartz had mainly in mind the West Indian plant and described it accurately and recognizably, and that Michaux was dealing with the North American alone, their names are, strictly interpreted, nomenclatural synonyms of *A. polypodioides* and its type must be theirs, regardless of the plants their authors actually had in hand. The simplest way of dealing with the situation is to typify *A. polypodioides* by the West Indian element, to regard the four names above discussed, all either of dubious identity or nomenclaturally disreputable, as absolute synonyms of it, and to coin a new name for the North American variety. At least, this has the advantage of making the Linnaean specimen, which is of the West Indian phase, representative of his species.

The key which follows carries with it the caveat which should be understood with all keys to varieties—that it necessarily deals with averages in plastic groups and cannot be expected to name accurately all extant specimens. It may be added that small orbicular scales are present in all the groups here treated, but in most are concealed by an outer layer of larger ovate to ovate-lanceolate scales. These latter, larger and more conspicuous scales, are those described.

No attempt has been made to cite all the numerous specimens examined. A representative selection only, particularly of numbered collections found in more than one herbarium, accompanies each group recognized.

I am indebted to the kindness of Mr. A. H. G. Alston of the British Museum, Mr. S. Savage of the Linnean Society of London, Dr. William R. Maxon and Mr. C. V. Morton of the United States National Museum and Mr. Louis C. Wheeler of the Gray Herbarium for information and helpful suggestions, and to the authorities of the various institutions above-mentioned for the privilege of consulting their collections.

a. Veins all free, ending in translucent hydathodes; upper surface of lamina entirely glabrous; all scales entire, those of the rhizome usually with blackish, sclerotic central band. Southeastern Africa.....1. *P. Eckloni.*

a. At least some veins anastomosing, without hydathodes; upper surface of lamina with at least a few scales on rachis; rhizome-scales fimbriate-serrulate, or, if entire, without a blackish, sclerotic central band....*b.*

b. Scales all strongly fimbriate-serrulate; leaf-tissue of upper surface of lamina bearing scattered scales; venation often almost completely goniophlebioid....*c.*

c. Scales of lower surface of lamina prevailingly ovate to ovate-lanceolate, acute to acuminate. West Indies, Central America and coastal regions of northern South America.....2. *P. polypodioides.*

c. Scales of lower surface of lamina with ovate dilated base and conspicuous subulate apex. Northern and central South America.....2a. *P. polypodioides* var. *Burchellii.*

b. Scales of lower surface of lamina entire or only shallowly and minutely serrulate; only part of the veins anastomosing....*d.*

d. All scales entire, those of the rhizome usually without blackish, sclerotic central band, those of the lower surface of the lamina with ovate basal portion and conspicuous, somewhat spreading, subulate apex; leaf-tissue of upper surface glabrous; most fronds less than 10 cm. tall with pinnae 2 mm. or less wide. Southern Brazil to northern Argentina.
2b. *P. polypodioides* var. *minus.*

d. Scales of the rhizome more or less fimbriate-serrulate, with blackish, sclerotic central band; scales of lamina closely appressed; well-developed fronds more than 10 cm. tall....*e.*

e. Leaf-tissue of upper surface glabrous; scales of lower surface prevailingly orbicular to deltoid-ovate, obtuse or acute. Southeastern United States to Texas, Mexico and Guatemala..2c. *P. polypodioides* var. *Michauxianum.*

e. Leaf-tissue of upper surface sparsely paleaceous; at least some scales of lower surface, particularly the marginal, with small dilated basal portion abruptly contracted into a long, acicular tip. Mexico and Central America.....2d. *P. polypodioides* var. *aciculare.*

1. Polypodium Ecklonı Kze. in Linnaea x. 498 (1836). Type not designated and no certainly authentic material seen, though specimens without definite locality collected by *Drege* in K and BM may represent one or more of the collections cited by Kunze. In any case, the description and the exclusively South African localities given sufficiently fix the application of the name.

Scales of the rhizome usually quite entire with broad, black, sclerotic central band and narrow, pale-brown hyaline margin, lance-subulate, 3–4 mm. long, mostly less than 0.5 mm. wide. Scales of the lamina 1 mm. or less long, from orbicular to ovate or with broad-ovate base and short subcaudate tip, those of the rachis up to 2 mm. long and

lance-acuminate, rather dull brown when young, weathering gray with or without a dark spot at the point of attachment. Marginal scales scarcely visible or at least not prominent at the cartilaginous-thickened margin when seen from above. South Africa from Rhodesia to Cape Colony.[1]

Rhodesia: Moramballa, *Waller* (G, K). Transvaal: *Schlechter* 4451 (BM, K). Natal: *Rudatis* 855 (BM, K); *Gerrard* 466 (BM, K); *Miles* (G); *Abraham* 62 (G). Kaffraria: *Baur* 40 (K); *Cooper* 1425 (BM); *Sim* 1586 (G). Cape Colony: *Cooper* 2911 (K).

P. Eckloni is here maintained as a species on the basis of its venation. Dried specimens are quite opaque but when boiled out the veins become clearly visible by transmitted light. I have, however, been able to examine them only in comparatively few specimens. In these, the venation is very uniform—simple or once-forked ultimate veins, in the latter case with nearly equal, rather strongly divergent branches, never with secondary forking and never forming areoles. The veins or their branches invariably end in a hydathode, visible on the upper surface of dried fronds as a small pit and as a translucent dot by transmitted light. I have detected no such structure in *P. polypodioides.*

Sim (Ferns So. Africa, ed. 2. 271 (1915)) described the venation of the African plant as "anastomosing or free." He was, however, treating it as part of an inclusive *P. polypodioides;* his description may well have been drawn to cover all phases of that complex. Mettenius (Polypodium p. 68, no. 99 (1857)), surely an accurate observer, described the veins as free. I follow him in regarding *P. Eckloni* as a species distinct from *P. polypodioides.* Should examination of more material than I have been able to see, or than Mettenius presumably had, reveal cases of areolate venation, the claim of *P. Eckloni* to specific rank would, of course, be correspondingly weakened. The hydathodes, however, would remain a distinctive feature.

The scale-characters of *P. Eckloni* are reasonably well portrayed in Sim's plate 136.

2. Polypodium polypodioides (L.) Watt in Canad. Nat. ser. 2, iii. 158 (1867). *Acrostichum polypodioides* L. Sp. Pl. 1068 (1753), excl. syn. Morison et Gronov. Lectotype from Jamaica, herb. Plukenet (BM; seen). *A. ferruginosum* L. Sp. Pl. ed. 2. 1525 (1763). Type not known to exist. *A ferrugineum* L. Syst. Nat. ed. 12, ii. 686 (1767). Change of name, or error, for *A. ferruginosum.* *P. incanum* Sw. Prod. Veg. Ind. Occ. 131 (1788), nomen illegitimum. *P. ceteraccinum* Michx. Fl. Bor.-Am. ii. 271 (1803), nomen illegitimum. "*P. velatum* Schk." Krypt. Gewächs. 188 (1809). *P. chrysoconion* Spreng. Syst. Veg. iv.

[1] Characters given in the key are usually not repeated in these descriptive notes.

51 (1827). Type, if any, not seen, but plate and description of Plumier cited no doubt this species.

Scales of the rhizome 3.4–4 mm. long, 0.4–0.6 mm. wide, usually with a relatively narrow, dark-brown or blackish, sclerotic central band and a relatively broad, pale-brown, deeply fimbriate-serrulate hyaline margin. Scales of the lamina about 1 mm. long, ovate, acuminate, or sometimes caudate-acuminate (if so, the tip weak, pale and less than 1 mm. long), light brown in mass, tardily weathering gray, with a broad deep-brown central portion rather than a mere dot at the point of attachment as in var. *Michauxianum;* those of the margin strongly pectinate-serrulate, a single row passing over to the upper surface and attached there. Scales of the upper surface with peltate, stellate or pectinate-toothed base and lance-subulate, sparsely long-toothed blade. Rachis above densely scaly. Veins once or twice forked, the branches often uniting with those of adjacent veins to form areoles, the resultant pattern not infrequently almost completely goniophlebioid.

MEXICO: YUCATAN: *Gaumer* 1110 (G, K, P). CHIAPAS: *Ghiesbreght* 445 in pt. (G, K). GUATEMALA: Puerto Barrios, Dept. Izabal, at sea-level, *Standley* 2503 (G, US; somewhat transitional). BRITISH HONDURAS: Honey Camp, *Lundell* 94 (G); Stann Creek, 10 ft. alt. *Schipp* 349 (BM, G); Toledo, *Peck* 645 (G). NICARAGUA: Granada, *Maxon, Harvey & Valentine* 7621 (G, US). COSTA RICA: Guanacaste Prov. *Dodge & Thomas* 7881 (G). WEST INDIES: BAHAMAS: Andros, *Small & Carter* 8698 (G, K). CUBA: *Wright* 795 (G, P); *Shafer* 1469 (G, K); *Pollard & Palmer* 392 (G, US). JAMAICA: 1731, *Houstoun* (BM); *Maxon & Killip* 205 (G, US). HAITI: *Leonard* 4535 (G, US). SANTO DOMINGO: *Türckheim* 2734 (BM, G, K); *Fuertes* 1080 (BM, G, K, P). PORTO RICO: *Sintensis* 424 (BM, G, K, P). ANTIGUA: *Rose, Fitch & Russell* 3326 (G, US); *Box* 200, 216, 220 (BM). ST. KITTS: *Britton & Cowell* 200 (K). GUADELOUPE: *l'Herminier* 113 (K, P), s. n. (BM). ST. VINCENTS: *H. H. & G. W. Smith* 975 (G). TOBAGO: *Broadway* 4877 (G). GRENADA: 1905, *Broadway* (G). TRINIDAD: *Fendler* 37 (BM, G, K). VENEZUELA: Cristobal Colon, *Broadway* 196, 766 (G); Margarita Island: *J. R. Johnston* 157 (G).

P. polypodioides is a common plant in the West Indies, in Haiti ascending to 2000 m., on the continent apparently found only at low altitudes. It is *P. incanum* var. δ of Mettenius as to the West Indian and probably the Guatemalan specimens cited. Those from South America are presumably to be placed with var. *Burchellii.*

Schkuhr, Krypt. Gewächs. plate 11b, gives an admirable illustration.

2a. POLYPODIUM POLYPODIOIDES var. **Burchellii** (Baker), comb. nov.

Polypodium incanum var. γ *Burchellii* Baker in Mart. Fl. Bras. i. pt. 2, 526 (1870). TYPE *Burchell* 6998 (K, seen; isotype G).

Similar to the typical variety and quite like it in venation; but the rhizome-scales tending to have a more developed and conspicuous black, sclerotic central band and narrower pale margins; those of the upper surface more numerous and with large basal portion; those of the lower surface having the darker coloring in the center more diffused, and tapering more gradually to the long subulate apex. The scales of the margin, one row of which passes over to the upper surface as in the typical variety, are mostly not deeply toothed. Those of the lower surface are of a particularly rich, deep brown, only tardily weathering gray.

FRENCH GUIANA: Cayenne, *Broadway* 138 (G); *Leprieur* 298 (P), s. n. (G). VENEZUELA: Tovar, *Fendler* 253 (G, P); Caracas, *Moritz* 21 (BM, K); *Pittier* 9474 (G, US). COLOMBIA: Toledo, Dept. Norte de Santander, 1700–1900 m. *Killip & Smith* 20126 (G, US); Santa Marta, *H. H. Smith* 1029 (BM, K, G). ECUADOR: GALAPAGOS ISLANDS: Albemarle Isl., *Stewart* 944 (G); Chatham Isl., *Wood* (K). PERU: Estrella, Ayacucho, *Killip & Smith* 23060 (G, US); Misione Tocache, *Poeppig* (P). BOLIVIA: Buena Vista, Santa Cruz, *Steinbach* 5289, 7774 (G); without locality, *d'Orbigny* 246 (P). BRAZIL: *Glaziou* 12370 (P). GOYAZ: *Burchell* 9097, 9202 (K, P). PARÁ: Santarem, *Spruce* s. n. (BM, G).

Var. *Burchellii* bears much the same relation to the typical variety as does var. *aciculare* to var. *Michauxianum*, and may be regarded as a derivative of the West Indian plant. Indeed, the difference in scales is largely one of degree. Baker, whose treatment of the Brazilian variants is otherwise good, based his variety solely on *Burchell* 6998, a collection of small, young plants with relatively large lamina-scales, and apparently had habit mainly in mind, for he referred the other Burchell numbers above cited and additional material which almost certainly belongs here to typical *P. incanum*.

As noted in the introductory remarks, var. *Burchellii* has a more generalized and less conventional range than any of the other varieties. It occurs more or less throughout South America north of the Tropic of Capricorn and from sea-level to an altitude of some 2000 m. on the slopes and in the valleys of the Andes. It would seem ecologically the most adaptable of the varieties, as it is the widest spread.

Hooker (Sp. Fil. iv. 209 (1862)) reports *P. incanum* from Chile (Atacama), but I have seen no specimens from that region. He may have mistaken the habitally similar *P. masafuerae* Phil. for *P. incanum;* but if any form of *P. polypodioides* does occur in northern Chile, it would most probably be var. *Burchellii*.

2b. Var. **minus** (Fée), comb. nov. *Marginaria minima* Bory in Dict. Class. x. 177 (1826). TYPE *d'Urville* 60 from Santa Catharina Island, Brazil (P; seen). *Polypodium microlepis* Fée, Gen. Fil. 238 (1852); Mém. Foug. vi. 8, t. 6, f. 2 (1854). TYPE *Pamplin* 38, perhaps in herb. Drake at Paris, but not seen by me. *Goniophlebium incanum* β *minus* Fée, Crypt. Vasc. Brés. 107 (1869). Based on *Marginaria minima* Bory. *P. incanum* var. β *squalidum* Baker in Mart. Fl. Bras. i. pt. 2, 526 (1870). Epithet taken from Vellozo, whose name had not then been validly published, and was here first associated with a description. *P. squalidum* Vell. Fl. Flum. xi. t. 76 (1827), nomen nudum; in Arch. Mus. Nac. Rio Janeiro v. 449 (1881). *P. minimum* (Bory) Hert. in Anal. Mus. Nac. Montevideo ser. 2, i. 368, t. 28 (1925), nec Moore (1857), nec Baker (1879).

Rhizome-scales bright chestnut-brown with somewhat paler margins, but usually without a black, sclerotic central band. Scales of the lower surface of the lamina usually imbricate, with broad-ovate or subrhombic blades rather gradually contracted into the subulate, spreading tip. Marginal scales not reaching the upper surface, their tips only folded over on it. Pinnae 2 mm. or less wide.

BRAZIL: Sebastianopolis, *Burchell* 1001 (G, K, P); *St. Hilaire* A111 (P); without definite locality, *Riedel* (G, P). RIO DE JANEIRO: *Wilkes Exp.* 3 (G, K, US); *Gaudichaud* 176 (K, P); *Gardner* 25 (BM, K, P). RIO GRANDE DO SUL: Neu Wurttemberg, *Bornmüller* 123 (G). PARAGUAY: Alto Paraná, *Fiebrig* 138 (BM, G, K); Caagnazú, *Hassler* 9065 (G, K, P). URUGUAY: Tacuarembó, *Herter* 820, 820A (G). ARGENTINA: FORMOSA: *Jörgensen* 2579 (G). CHACO: Fontana, *T. Meyer* 33 (G); Colonia Benítez, *A. G. Schulz* 725 (G). MISIONES: Posadas, *Burkart* 1364 (G). TUCUMÁN: La Cruz, *Lorentz* 318 (BM). BUENOS AIRES: delta del Paraná, *Burkart* 1239 (G).

Because of its consistently small size and narrow pinnae, var. *minus* has a distinctive appearance, but it lacks technical characters stronger than those of the other varieties here considered and is so connected with the typical variety, both in scale-characters and, at least in occasional specimens, in habit, by var. *Burchellii*, that it seems best treated as a variety of *P. polypodioides*, geographically and morphologically the end of a *type-Burchellii-minus* series. In its glabrous upper surface and nearly entire scales it tends toward var. *Michauxianum*, but the character of its scales is otherwise quite different; and its small size and nearly concolorous rhizome-scales are all its own. If treated as a species, as by Fée and by Herter, its first available name is *P. microlepis* Fée.

2c. POLYPODIUM POLYPODIOIDES, var. **Michauxianum**, var. nov., a varietate typica differt lamina supra rachi excepta glabra, paleis paginae inferioris orbicularibus vel deltoideo-ovatis, obtusis vel

acutis, integris vel leviter serrulatis.—*Acrostichum polypodioides* L. Sp. Pl. 1068 (1753) quoad syn. Morison et Gronovius. *P. ceteraccinum* Michx. Fl. Bor.-Am. ii. 271 (1803) quoad plantam boreali-americanam, non quoad basinymon *Acrostichum polypodioides*.

Scales of rhizome linear-subulate, 2.5–3 mm. long, 0.3–0.4 mm. wide, with blackish, sclerotic central band and rather conspicuous, pale brown, hyaline margins. Scales of lower surface of lamina orbicular to deltoid-ovate, obtuse to acute or subacuminate, 0.4–0.8 mm. long, bright brown when young, soon weathering gray with a dark brown spot at the point of attachment, the marginal, though attached on the lower surface, folded over the margin on to the upper surface, so that their tips are often conspicuous as seen from above. Upper surface of rachis usually bearing sparse scales which are entire or somewhat pectinately toothed at base. Veins forked, the branches tending to be convergent, one of them usually giving off a short secondary branch, free or the secondary branches occasionally uniting with adjacent veins to form areoles.

On trees, old buildings or sometimes on rocks, Maryland, Illinois and Missouri to Florida, Texas and Guatemala. UNITED STATES: MARYLAND: Great Falls of the Potomac, 1902, *Wm. Palmer* (K, G, US). VIRGINIA: *Clayton* 685 (BM); Natural Bridge, *Pursh* (K); Kilby, Nansemond Co., *Fernald, Long & Fogg* 4703 (TYPE, G). NORTH CAROLINA: French Broad River, 1842, *A. Gray* (G); Swain Co., *Beardslee & Kofoid* Aug. 18, 1891 (BM, G). SOUTH CAROLINA: *Wiegand & Manning* 14 (G); *Bosc* (P); *Gibbes* (P). GEORGIA: Athens, *R. M. Harper* 59 (G). FLORIDA: *Curtiss* 3665 (G, K, P); *Small & Lowe* 7396 (G). KENTUCKY: *Smith & Hodgdon* 3942 (G, US). TENNESSEE: Cheatham Co., *Svenson* 267 (G). ALABAMA: *Pollard & Maxon* 210 (G, US). MISSISSIPPI: Natchez, *Holton* (G). LOUISIANA: *Drummond* 494 (K, P); *Hale* (G). ILLINOIS: Makanda, *Gleason* 2896 (G). MISSOURI: Campbell, *Bush* 6254 (G). ARKANSAS: *Bush* 1651 (K), 5646 (G). OKLAHOMA: Johnston Co., *Stevens* 3531 (G). TEXAS: *E. J. Palmer* 11446 (G, BM); *Reverchon* 1182 (P). MEXICO: COAHUILA: *E. Palmer* 447 in 1904 (G, K, US), 1376 in 1880 (G, K, P, US). TAMAULIPAS: *E. Palmer* 295 in 1907 (G, US). GUATEMALA: Izabal, *Salvin* (G; large fronds with the pinnae dilated above and with a subacute apex); walls of old fort, San Felipe, *Deam* (G).

Occasional specimens from the United States, especially, as might be expected, in southern Florida, show transitions in the form of the scales of the lamina to the typical variety. Such are sheets from Kittrell Springs, North Carolina, *Faxon* (G); Longboat Key, Florida, *Tracy* (G, US); and Sand Springs, Oklahoma, *F. C. Greene* (G, US). The occasional presence of single fronds showing transitional scales in collections otherwise typical indicates that a considerable degree of variation may take place in the same colony. And in Mexico, where

the ranges of three varieties touch, transitional material is not uncommon. But almost without exception, specimens from the United States and those from Mexico which are otherwise to be referred to this variety have the leaf-tissue quite glabrous on the upper surface. Indeed, this character, though slight in itself, is more constant than any other single feature and correlates better with geographic range. I have taken it as decisive in doubtful cases.

2d. POLYPODIUM POLYPODIOIDES var. **aciculare**, var. nov., a varietate *Michauxiano* differt laminae pagina superiore sparse paleacea, paleis basi pectinato-dentatis vel -lobatis, paginae inferioris paleis nonnullis praesertim marginalibus e basi orbiculari vel ovato minimo 0.2–0.3 mm. longo in acumen subulato-aciculare integrum vel breviter serrulatum abrupte angustatis.

Scales of the rhizome with rather narrow, black, sclerotic central band which is sometimes present at the base only, and correspondingly broad, pale-brown, lightly and shallowly denticulate margin. Scales of the upper surface with very small, pectinate-stellate basal portion and relatively long acumen. Marginal scales borne exactly on the margin or sometimes passing over to the upper surface. All scales rather dull in color, soon weathering gray and with a dark brown spot at the point of attachment, the caudate tip also dark. Venation as in var. *Michauxianum*.

MEXICO: SAN LUIS POTOSI: *Virlet d'Aoust* 26 (P). DURANGO: Sianori, *Ortega* 5304 (G). JALISCO: *Galeotti* 6438 (K, P). COLIMA: Socorro Island, *Barkelew* 236 (G); Colima, *E. Palmer* 1229 in 1891 (G, US). MICHOACAN: Morelia, *Arsène* 2965 (G). VERA CRUZ: Zacuapan, *Purpus* 5799 (BM, G, K, P); Orizaba, *Bilimek* 48 (G, K, P). OAXACA: Cerro San Felipe, *Conzatti & Gonzales* 877 (G). CHIAPAS: *Ghiesbreght* 248 (G). GUATEMALA: Santa Rosa, *Heyde & Lux* 4089 (G, US); Duenas, *Salvin* (G). EL SALVADOR: Volcán de San Salvador, *Standley* 22961 (G, US); Sierra de Apaneca, *Standley* 20173 (G, US); Volcán de San Vicente, *Standley* 21570 (G, US). HONDURAS: Siguatepeque, *Yuncker, Dawson & Youse* 5579 (G, US), 6017 (G, US). COSTA RICA: San Ramón, *Brenes* 14266 (G); San Francisco de Guadelupe, *Tonduz* 8476 (TYPE in Herb. Gray); San Jose, *Standley* 33312 (G, US); La Carpintera, *Dodge* 3508 (G); without locality, Nov., 1886, *Cooper* (G, K); Guanacaste Prov., *Dodge* 6330, 6442 (G).

Var. *aciculare*, in the general character of its scales, is clearly a Central American derivative of var. *Michauxianum*. It has not failed to attract the attention of previous investigators, but seems never to have received a name. It is in all probability *P. incanum* var. γ of Mettenius (Polypodium no. 100, p. 69 (1857)) and certainly *P. incanum* var. γ of Fournier (Mex. Pl. i. 83 (1872)). Maxon

(Contr. U. S. Nat. Herb. xvii. 585–6 (1916)) briefly discussed its scale-characters and even gave it an herbarium name (as it happens, the same which I independently hit upon), but went no farther.

Dubious and Excluded Names.

Polypodium albidum Presl, Del. Prag. i. 165 (1822). This is given as a synonym of *P. polypodioides* in the Index Filicum. The type, from Rio de Janeiro, could not be found at Praha in 1937; the description does not apply well to either of the South American varieties of *P. polypodioides.* "Squamis . . . tenuissime ciliatis" and "pinnae . . . superne . . . squamulis . . . adspersae" at once eliminate var. *minus;* and whitish scales and pinnatifid lamina-tip do not fit well with var. *Burchellii.* In any case, Presl's epithet could not be used for either, treated as a variety; both already have tenable varietal names.

Polypodium incanum var. *fimbriatum* Mart. & Gal. in Mém. Acad. Brux. xv. 36 (1842). I found no type specimen in the Martens herbarium. Two numbers of Galeotti, 6438 and 6443, are cited. The specimens of the former number both at Kew and Paris belong to *P. polypodioides* var. *aciculare;* the latter, at Paris, is *P. thyssanolepis.* Both the original description and the name chosen apply to the latter species; no. 6443 should be taken as the type and *P. incanum* var. *fimbriatum* included in the synonymy of *P. thyssanolepis.*

Polypodium incanum var. *umbrosum* Liebm. Vid. Selsk. Skr. ser. 5, i. 212 (seors. 60) (1849). The type is presumably at Copenhagen; I have not seen it. The description calls for a large plant with naked upper surface of the lamina and sparsely scaly lower one, but gives no other significant detail. As far as it goes, it suggests such a large individual of *P. polypodioides* var. *Michauxianum* as the collection of Salvin from Izabal, Guatemala. But var. *Michauxianum* is not known from southern Mexico and has been found in Guatemala only in a very restricted region; and Liebmann's diagnosis might apply to some other species, such as *P. guttatum* Maxon.

P. incanoides Fée, Mém. Foug. viii. 88 (1857). I cannot, at present, determine the exact identity of this. The type, if it exists, is presumably in Brazil; and I have seen no material of the type collection, *Schaffner* 199 from Huatusca, state of Vera Cruz, Mexico. Fée's description makes it reasonably clear that he had a form with the pinnae dilated and sorus-bearing toward the apex; but such states occur in both of the varieties to be found in Vera Cruz.

P. incanum var. *oblongum* Fourn. Mex. Pl. i. 83 (1872). This was founded on *P. incanoides* Fée and must remain similarly uncertain.

P. mesetae Christ in Bull. Herb. Boiss. ser. 2, vi. 49 (1906). Maxon places this species in the synonymy of *P. polypodioides*. I have not seen the type, *Alfaro* 16907 from Costa Rica; but Christ's description of the rhizome-scales as "brunneis, setaceis, strigillosis" and of the stipes as setulose below suggests some other species.

I realize that it is by no means impossible that some of the names here rejected as doubtful may prove to apply to one or both of the varieties described as new. Only actual examination of the types concerned can settle that; and it may be a very long time before such examination is possible, if ever. Less confusion will result from putting forward a new name of definite application which may later have to be abandoned than from taking up an old one in the wrong sense.

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7. A MISCELLANY OF NEW WORLD EUPHORBIACEAE.

By Louis Cutter Wheeler.

The identity and nomenclature of sundry New World Euphorbiaceae and alleged Euphorbiaceae are herein discussed. Material for this study has been borrowed from Field Museum, Chicago; Pomona College, Claremont, California; University of California, Berkeley; and U. S. National Herbarium. The writer hereby expresses his gratitude to the curators of these institutions for their kindness in loaning essential specimens.

Hieronyma Fendleri Briquet in Ann. Cons. Jard. Bot. Genève **4**: 227. 1900. The reduction of this to a variety of *H. Moritziana* (Muell. Arg.) Pax & Hoffmann, Pflanzenreich IV. **147(15)**: 33. 1922 (based on *H. macrocarpa* α *Moritziana* Muell. Arg., Linnaea **34**: 66. 1865), by Pax & Hoffmann, idem, is contrary to the rules of priority (Rules, Art. 16). If these two entities are but varietally distinct the reduction should be reversed.

Phyllanthus nobilis (L. f.) Muell. Arg., DC. Prod. **15(2)**: 414. 1866; based on *Margaritaria nobilis* L. f., Suppl. Pl., 428. 1781, as to the female plant only. According to Muell. Arg., idem, the male plant was Combretacea. Consequently, under Article 64 of the Rules, this name must be abandoned:

"Art. 64. A name of a taxonomic group must be rejected if the characters of that group were derived from two or more entirely discordant elements, especially if those elements were erroneously sup-

posed to form part of the same individual. A list of the names to be abandoned for this reason (*Nomina confusa*) will form Appendix V."

The name to be applied to this concept is, according to the synonymy given by Muell. Arg., *Phyllanthus antillanus* (Adr. Jussieu) Muell. Arg., Linnaea **32**: 51. 1863; based on *Cicca antillana* Adr. Jussieu, Euphorb. Gen. Tent. 108, Pl. 4, fig. 13B. 1824.

PHYLLANTHUS VIRIDIS M. E. Jones, Extracts from Contrib. West. Bot. **18**: 47. 1933; based on *M. E. Jones 27503*, Oct. 2, 1930, Cacachilla Mountains, Lower California, Mexico (Pomona College No. 191590 type; Gray Herb. isotype). The type of this is a good match for the type of *Colubrina glabra* S. Wats., Proc. Am. Acad. **24**: 44. 1889: *Ed. Palmer 200 in 1887*, Guaymas, Sonora, Mexico (Gray Herb.).

CROTON CRENULATUS M. E. Jones, Extracts from Contr. West. Bot. **18**: 48. 1933. Type: Cayuca Ranch, Loreto, Lower California, Oct. 23, 1930, *M. E. Jones 27499* (Pomona College Herbarium No. 191581; duplicate in Gray Herbarium). This is a *Bernardia* and seems best referable to *B. mexicana* (H. & A.) Muell. Arg. var. *genuina* Muell. Arg. for the present. It may prove to be varietally distinct. Both Pax, Pflanzenreich, IV. **147**(**7**): 24. 1914, and Standley, Contr. U. S. Nat. Herb. **23**: 633. 1923 (Trees and Shrubs Mex.) cite *B. Brandegei* Millsp., Proc. Cal. Acad., ser. 2, **3**: 172. 1891, in synonymy under *B. mexicana*. The type of Millspaugh's *nomen nudum* came from San José del Cabo (the tip of Lower California). In spite of this, neither Pax nor Standley gives the range of *B. mexicana* as other than southeastern Mexico and southward.

CROTON PALMERI S. Watson var. OVALIS Fernald, Proc. Amer. Acad. **36**: 493. 1901 (Apr.). An examination of the type (hb. Gray) reveals that this is identical with *C. leucophyllus* Muell. Arg. var. *trisepalis* Ferguson, Rep. Mo. Bot. Gard. **12**: 57. 1901 (Feb.). This well-marked variety is represented in Gray Herbarium by the following four collections all of which are from Monterey, Nuevo Leon, Mexico: *Pringle 11163* (distributed as *C. Lindheimerianus* Scheele); *G. Arsène 6318* (*Bro. Abbon 151*); *Pringle 2225* (distributed as *C. capitatus* Michx.); *C. & E. Seler 1047* (type of *C. Palmeri* var. *ovalis*).

There is in Gray Herbarium a specimen of this variety purporting to have come from Brazil. It was distributed as a *forma* (under a geographical name based on "Brasil" and attributed to Muell. Arg. but apparently unpublished) of *Croton capitatus* Michaux. The collector's name is illegible. The label is the large (ca. 5¼ x 3¼ inch) black-framed label similar to that described by Standley, Science n. s. **65**:

130–133. 1927, which was distributed in fake sets; but in this case the plants were originally from Mexico and falsely from Brazil which is the reverse of the later situation exposed by Standley. The heading of the label is "Plantae Brasiliae et Indiae occidentalis." The "Ind. occ." was crossed out. The great similarity of aspect of the two specimens makes it appear that the plants allegedly from Brazil were really from Monterey, Nuevo Leon, *G. Arsène 6318* (*Abbon 151*).

CROTON TRAGIOIDES Blake in Contr. U. S. Nat. Herb. **24**: 12. 1922. Type: Shore of Lake Izabal, Dept. Izabal, Guatemala, *S. F. Blake 7854* (U. S. Nat. Herb. No. 989621!). The type differs in no way from the common tropical American weed *Croton trinitatis* Millsp. in Field Mus. Pub. Bot. **2**: 57. 1900; based on *Croton chamaedryfolius* Lam. *sensu* Griseb., Fl. Brit. W. I., 41. 1859. The name cannot be based on *Geiseleria chamaedryfolia* (Lam.) Klotzsch in Hooker, Journ. Bot. **2**: 47. 1843, for Klotzsch gave no diagnosis and based his name directly on *Croton chamaedrifolium* [original spelling] Lam., Encyc. Meth. Bot. **2**: 215. 1786. *Croton Miquelensis* Ferguson, Rep. Mo. Bot. Gard. **12**: 48. 1901 (corrected? to "*Miquelianus*" by Lanjouw in Pulle, Fl. Surinam **2**: 38. 1932) has exactly the same basis as *Croton trinitatis* Millsp. It is well to explain that Mueller Argovensis, DC. Prod. **15(2)**: 879. 1866, transferred *Croton chamaedrifolium* Lam. to *Acalypha* and that disposition is accepted by F. Pax & K. Hoffmann, Pflanzenreich IV. **147(16)**: 29. 1924. At the same time Mueller (p. 686) continued to use *Croton chamaedryfolius sensu* Griseb. in order to perpetuate the name in the established sense under *Croton*. Such a procedure is now considered untenable either under the homonym rule (Art. 61), or under the rule prohibiting continued use of a name after its type has been removed (Art. 18).

CROTON **Wigginsii** nom. nov.; based on *Croton arenicola* Rose & Standley in Contr. U. S. Nat. Herb. **16**: 12. 1912, not Small in Bull. N. Y. Bot. Gard. **3**: 428. 1905.

The type: Sandhills, Adair Bay, Sonora, Mexico, Nov. 20, 1908, *G. Sykes 62* (U. S. Nat. Herb. 574267) is before me. It seems to be quite distinct by the larger seeds from its closest relative, *Croton californicus* Muell. Arg. and its variants. This collection of Sykes is the only one known to me. Perhaps the species will be re-collected when someone else has the hardihood to visit Adair Bay and make a collection of the plants. It is a pleasure to associate the name of Dr. Ira L. Wiggins, who is now studying the flora of the Sonoran Desert, with one of the rarities of that area.

Since the above was set in type a second collection of *Croton Wig-*

ginsii has transpired, to wit: Algodones Sand Hills one mile east of Gray's Well on U. S. Highway No. 80, Imperial County, California, May 17, 1938, *R. S. Ferris & R. P. Rossbach 9584* (Gray Herb.).

CROTON SITIENS T. S. Brandegee, Univ. Calif. Pub. Bot. **10**: 185. 1922. Based on *C. A. Purpus 8732*, April, 1922, Remulatero, Vera Cruz, Mexico (Univ. Calif., type; Gray Herb.). Type seen! This is identical with *Ditaxis tinctoria* (Millsp.) Pax & Hoffm., Pflanzenreich IV. **147(6)**: 59. 1912, based on *Argythamnia tinctoria* Millsp., Field Mus. Pub. Bot. **1**: 302. 1896. Type: *G. F. Gaumer 426* in 1895, Yucatan (Field Mus. no. 36229!). The statement by Millspaugh, l. c., 285, "Plants collected by Dr. George F. Gaumer in 1885, . . ." seems to contradict the date "1895" printed on the label but the number 426 agrees and Millspaugh marked the sheet "Type," so type it is. Many of the leaves of Millspaugh's type are large (to 7.5 cm. long) and glabrous above, while the leaves of *Purpus 8732* are mostly not over 3 cm. long and vestite above. But *Gaumer 1045* from Yucatan (Field Mus.) has large leaves agreeing with *Gaumer 426* in lack of vesture on the upper surface but also smaller ones clothed on both sides essentially as *Purpus 8732*. The Purpus plant appears to have suffered from lack of moisture. *D. tinctoria* is doubtfully distinct from *D. guatemalensis* (Muell. Arg.) Pax & Hoffm.

EREMOCARPUS Bentham. Since my recent defense (Madroño **4**: 272–273. 1938) of the nomenclatorial validity of this genus, further corroborative evidence has been discovered: Post & Kuntze, Lexicon Gen. Phaner., 201. 1904, give "Eremocarpus" Lindley as equaling *Eremodaucus* and "Eremocarpus" Reichenbach as equaling *Eremosporus*. I had independently arrived at the same conclusion.

There is a curious error in literature as to the number of species in this genus. It were well to correct it before it gains general credence from much repetition. Only one species is accepted in the genus and only one has been validly published. However, F. Pax in Engler & Prantl, Nat. Pflanzenfam. **3(5)**: 41. 1890, states "2 Arten, *E. setigerus* Benth. (Fig. 26 *E*) und *tenuis* Watson, im pacifischen Nordamerika, an sandigen Standorten, namentlich in der nähe der Küste." Evidently following this statement, Post & Kuntze, Lexicon Gen. Phaner., 201. 1904 state that *Eremocarpus* Bentham has 2 species in California. Later the error was repeated in more convincing form by F. Pax & K. Hoffmann in Engler & Prantl, Nat. Pflanzenfam., 2 Aufl., **19c**: 88. 1931: "*E. setigerus* Benth. (Fig. 43 *E*) und *E. tenuis* Watson im pazifischen Nordamerika an sandigen Stellen, meist an der Küste." The psychological basis of this *nomen nudum* is perhaps *Croton tenuis*

S. Watson, but it probably has no biological basis and doubtless arose by some lapse.

Ditaxis **polygama** (Jacquin) comb. nov. *Croton polygamum* Jacquin, Enum. Syst. Pl. Carib., 32. 1762; Select. Stirp. Amer., 255. 1763; not Geiseler, 1807. *Argythamnia polygama* (Jacq.) O. Kuntze, Rev. Gen. **2**: 593. 1891. Muell. Arg., DC. Prod. **15(2)**: 736. 1866, O. Kuntze, idem, and Pax, Pflanzenreich IV. **147(6)**: 55. 1912, all agree that this name is the earliest applicable to *Ditaxis lancifolia* Schlecht. in Linnaea **26**: 635. 1853. The earlier name was rejected, except by Kuntze, on the ground that it was incongruous.

Ditaxis **malpighipila** (Hicken) comb. nov. *Croton? malpighipilus* Hicken, Physis **2**: 106. 1916. Hicken had pistillate specimens only. The species is dioecious and it is difficult to distinguish *Croton* from *Ditaxis* without staminate flowers. However, the malpighiaceous character of the vesture should have suggested *Ditaxis*. The isotype in Gray Herbarium is staminate. The staminate flowers will be described here to complete Hicken's description: Staminate flowers ca. 3.5 mm. long, solitary in the axils; pedicels ca. 1.5 mm. long, with appressed malpighiaceous hairs; calyx clothed as the pedicel without, glabrous within, round, slenderly obconical, tapering to the pedicel, deeply five-parted, segments ovate-lanceolate; petals 5, glabrous, spatulate, entire, 4 mm. long, slightly exceeding the sepals; glands adnate to the column; stamens 10, in two verticels of 5 each, verticils approximate; staminodia 5, slender, strongly papillate.

This plant seems to belong to *Ditaxis* sect. *Inacanthium* Baill. as defined by Pax, Pflanzenreich IV. **147(6)**: 58. 1912. The following key will separate it from its nearest relative:

Leaves 1.6–2 cm. long, denticulate; ♀ petals about equaling the calyx. ..... *D. breviramea* (Muell Arg.) Pax & K. Hoffm.
Leaves 5–7 mm. long, entire; ♀ petals twice as long as the calyx. *D. malpighipila.*

Walter Fischer, collector of the type, has made a list of corrections for Plantae Fischerianae (Hicken, Physis **2**: 1-18. 1915, **2**: 101–122. 1916). This unpublished list of corrections, deposited at the Gray Herbarium, gives the following notes that are pertinent here:

"Page 2 Pl. Fisch. Paragraph 2 in section under "Ovservaciones," line 1, "habitat";—The author [Hicken] credits the collector with the notes on the habitat of the plants, but in very many instances they are his own; as an example: No. 139. (F. 190), a plant undoubtedly never seen in its native habitat by anyone save the collector, is incorrectly put down as found among conglomerates, whereas it is

very characteristic of this plant to grow only in the soft chalk-like formation of the bluffs on both sides of the river; . . ." Fischer no. 190 is the type collection of *Ditaxis malpighipila*.

ARGYTHAMNIA P. Browne, Hist. Jamaica, 338. 1756. Many authors have refused to accept this generic name as validly published by P. Browne. There seems to be no reason for rejecting Browne's attempt as ineffective publication for under the International Rules of Botanical Nomenclature, Article 43 "The name of a monotypic new genus based on a new species is validated: (1) by the provision of a combined generic and specific description (*descriptio generico-specifica*), or (2) . . .". Such a description was provided by Browne. Perhaps some workers considered this a unitary designation of a species but it is not since, though *Argythamnia* was assigned but one species, that species is given, under a polynomial, in a fashion exactly parallel to *Urtica* (pp. 336–338) to which eleven species are assigned. Pax & Hoffmann in Engler & Prantl, Nat. Pflanzenfamilien, 2 Aufl., **19c**: 94. 1931, refused to accept Browne's publication and cited "*Argithamnia* Sw. Prodr. (1788) 39." In the first place Swartz spelled it "*Argythamnia*" as did Browne, and, in the second place, if they refused to accept Browne's publication they should have taken C. G. Ludwig's publication in his posthumous Def. Gen. Pl., 434. 1760 (edited by Boehmer).

It appeared that *Ditaxis Brandegei* threatened the distinction between *Argythamnia* and *Ditaxis* in that it was described as having but one whorl of stamens. But, as noted under the discussion of *Sebastiana sarmentosa* Jones, Millspaugh erred in so describing his species and *Ditaxis* has always two whorls of stamens as contrasted with but one in *Argythamnia*.

BERNARDIA MAZATLANA M. E. Jones, Extracts from Contrib. West. Bot. **18**: 49. 1933; based on *M. E. Jones 22626*, Nov. 20, 1926, Mazatlan, Sinaloa, Mexico. Type in Herb. Pomona College, not seen. Isotype in Herb. Gray! This is identical with *Acalypha microphylla* Klotzsch in Seemann, Bot. Voy. Herald, 278. 1856,[1] type locality Mazatlan. In Gray Herbarium is a probable isotype bearing only the data: "N. W. Mex. Seemann." Pax & K. Hoffmann, Pflanzenreich IV. **147(17)**: 30. 1924, refer *A. microphylla* doubtfully to *A. chamaedrifolia* (Lam.) Muell. Arg., a species of the West Indies and tropical Florida. Besides the supposed isotype, *A. microphylla* is represented in Gray Herbarium by five other collections all of which are from the west coast of Mexico from Altata, Sinaloa, south

[1] See Sprague, Journ. Bot. **59**: 22–23. 1921 for date.

to Colima: Sinaloa: Altata, *T. S. Brandegee*, Sept. 2, 1904; Mazatlan, *W. G. Wright 1227*, *M. E. Jones 22626*. Colima: Colima, *Ed. Palmer 1251 in 1891*, p. p.; Manzanillo, *Ed. Palmer 935 in 1890*. Phytogeographic considerations would cast doubt on the supposed identity of the two species and they do appear fairly distinct. *A. microphylla* has, on the average, longer pistillate spikes bearing, in many cases, a terminal flower on a pedicel as much as 1 cm. long. The frequent absence of this terminal flower in fruiting specimens may be due to its having been broken. *A. chamaedrifolia* has shorter spikes without the terminal pedicellate flower and the terminal spikes are often androgynous.

ACALYPHA SANTAE-MARTAE Pax & Hoffmann, Pflanzenreich IV. **147(16)**: 121. 1924, is based on the same collection, *H. H. Smith 429*, as *A. asterifolia* Rusby, Descr. 300 New Species So. Am. Pl., 48. 1920, which is the earlier name. Pax & Hoffmann overlooked five other species of *Acalypha* published by Rusby in the same work. Oddly enough Rusby, l. c. 47, published *A. Williamsii* based on *R. S. Williams 655* overlooking his earlier publication, Bull. N. Y. Bot. Gard. **8**: 101. 1912, under the same name of what seems to be a different plant based on *H. H. Smith 656* from the same locality as Williams' collection.

ACALYPHA YUCATANENSE Millsp., Field Mus. Pub. Bot. **1**: 371. 1898, based on *Gaumer 1176* from Progreso, Yucatan. An apparent fragment of the type, and an isotype are in Gray Herbarium. Pax and K. Hoffmann, Pflanzenreich IV. **147(16)**: 176. 1924 include this name in the list of species not identified, yet, in the list of exsiccatae, they cite *Gaumer 1176* as *A. yucatanensis* (corrected gender). *A. yucatanensis* Millsp. is *A. Poiretii*.

SEBASTIANIA SARMENTOSA M. E. Jones, Extracts from Contr. West Bot. **18**: 49. 1933. Type: Primiera Agua, near Loreto, Lower California, Oct. 19 [on label, published as 15] 1930, *M. E. Jones 27544*, Pomona College Herbarium (not seen). Isotype (seen) at Gray Herbarium. Jones also cites "and near Loreto no. 27545." I suspect this is a number error (unless I have misread his wretched writing) for he distributed under this name from Mountain east of Loreto, Oct. 17, 1930, *M. E. Jones 27543* (Pomona, Gray). Both collections are *Ditaxis Brandegei* (Millsp.) Rose & Standley.

Millspaugh, Proc. Calif. Acad. Sci. II 2: 220. 1889, in describing *Argythamnia Brandegei* stated: "stamens 5, in a whorl near the summit of the column of filaments which is terminated by a few rudiments of stamens." Examination of an isotype in Gray Herbarium reveals

that in actual fact there are ten fertile stamens in two whorls of five each and five minute staminodia. Likewise *Jones* 27543, cited above, has the same number. Pax, Pflanzenreich IV. **147**(**6**): 69 & 72. 1912, also gives the number of stamens as five. It appears that Pax saw no specimens of the species for his description is a mere latinization of Millspaugh's original description.

EUPHORBIA **Howellii** nom. nov.; based on *E. diffusa* Hooker f. in Trans. Linn. Soc. **20**: 184. 1847, not Jacq., Misc. Austr. Bot. Chem. and Hist. Nat. **2**: 311. 1781.

It is a pleasure to name this species for Mr. John Thomas Howell, and thus commemorate a name so closely identified with the flora of the Galapagos Islands by applying the name to a member of that flora.

PEDILANTHUS **laurocerasifolius** (Miller) comb. nov.; based on *Tithymalus lauro-cerasifolius* Miller, Gard. Dict. ed. 8. Tithymalus No. 2. 1768. This species was described from cultivated plants. If any specimens of Miller's plants are extant the type will be chosen from them. Otherwise the species will have to rest on the Dillenian specimens of *Tithymaloides laurocerasi folio non serrato*, Dillenius, Hortus Elthamensis **2**: 383–4, T. CCLXXVII, F. 372. 1732, which are said to be extant. If these specimens cannot be found the Dillenian plate will have to serve as the principal means of identifying the species. The above-cited Dillenian description and plate and the specimens of the plants, if extant, are the basis of *Euphorbia Tithymaloides* β *padifolia* L., Sp. Pl. **1**: 453. 1753. Judging by the common identity of the polynomials cited under both names it is highly probable that *Euphorbia Tithymaloides* L. β *padifolia* L. and *Tithymalus lauro-cerasifolius* Miller are identical. This was also the conclusion of Haworth, Syn. Pl. Succ., 136. 1812.—*Pedilanthus padifolius* (L.) Poiteau in Ann. Mus. D'Hist. Nat. Paris **19**: 393. 1812 was really based on *Euphorbia Tithymaloides* β *padifolia* L. even though Poiteau cited "Euphorbia padifolia, Willd., sp. pl. tom. 2, p. 891" as the source. Examination of this reference shows that though Willdenow did have this binomial he had it as var. β which is, of course, Linnaeus'. Hence the authors of *Tithymalus padifolius* are (L.) Croizat, not (Willd.) Croizat.

8. TYPIFICATION OF THE GENERIC SYNONYMS OF PEDILANTHUS

By Louis Cutter Wheeler

In order to justify the statements as to the type species of the several genera proposed in the following article for rejection in favor of *Pedilanthus* Necker, it is deemed wise to present the reasons for these typifications. By presenting this closely related, but nevertheless peripheral, material in a separate article, the proposal for conservation is kept within more reasonable limits of size.

It is well to discuss at this first opportunity the matter of the date of publication of the important paper by Klotzsch, commonly known as "Tricoccae," in which Klotzsch & Garcke published many new genera and species of the tribe Euphorbieae. Two of the genera are involved here.

The confusion as to date of publication has arisen from the fact that a summary of the paper covering the general discussion and definition of genera was published in the Monatsberichte Akad. Berlin in 1859. To be sure, the title page of the volume for 1859 bears the date 1860. Nevertheless, the very fact that it was published in the "monthly report" of the Akademie suggests that, since it was read in March, 1859, it might have been published within that year. A casual examination of the volume for 1859 shows that, while fascicle covers are missing in the copy examined, the Monatsberichte for 1859 was issued in eight independently printed parts beginning on the following pages: 1, 127, 235, 408, 493, 638, 671, and 725. The last meeting reported was Dec. 22, 1859 which makes it probable that the last issue for 1859 did not appear till 1860 which probably explains the title page date. Having presented the above inferential evidence, the following bibliographic evidence is offered: Hasskarl, Flora **43**(**1**): 8–13. 1860 (Jan. 7), reviews Klotzsch's article. The review was dated Dec. 1, 1859. Consequently, to quote Miss Green of Kew to whom the writer is indebted for this information, ". . . as this review is dated 1 Dec. 1859 and appeared in the Jan. number of Flora, 1860, there can be no doubt that the date 1859 is correct." A final and conclusive point noted by Miss Green is that the copy at Kew of the reprint from the Monatsberichte is dated 1859.

Many authors seem to have seen only the reprint of the complete paper (Klotzsch, Abh. Akad. Berlin, Phys., **1859**: 1–108. 1860) which they frequently cite as "Tricoccae," or even abbreviate this. This practice is bibliographically deplorable. An example of the

consequences is furnished by Croizat, Amer. Journ. Bot. **24**: 703–4, footnote 6. 1937, where he states that the paper was not published until 1860. He concludes: "For pagination cf. the reference under *Hexadenia* & *Diadenaria*." On p. 703 he cites these genera as having been published on pages "106–107" of the Monatsberichte where in actual fact they appeared on pages 253 and 254 respectively. These pages, 106–107, alleged by Croizat to be from the Monatsberichte, are really those of the Abhandlungen! Another difficulty involved in using only the reprint is that there is nothing in the reprint to indicate the peculiar organization of the Abhandlungen for 1860. There are four independently paged and unnumbered parts. The first part is even unnamed. The other three are named. Klotzsch's paper was the first in the Physikalische part and the pagination of the reprint from the Abhandlungen corresponds perfectly with the pagination of the original article in the Abhandlungen.

Crepidaria Haworth, Syn. Pl. Succ., 136. 1812. Type species: *Crepidaria myrtifolia* (Miller) Haw., based on *Tithymalus myrtifolius* Miller; chosen here. The third species referred to the genus was placed in it questionably. The first two species are both eligible for consideration. Under the principle that an avowedly and actually superfluous name should be typified by the same type as that of the name for which it was illegally substituted, having chosen *Tithymalus myrtifolius* Miller as the type of *Tithymalus* Miller, it follows inevitably that the same species is also the type of *Crepidaria*. Furthermore, when two species are *equally* eligible, as in this case, the first is to be taken, according to the criteria given by Hitchcock in Science, n. s., **49**: 333–336. 1919, who has presented the most exhaustive consideration of the question.

Cubanthus (Boiss.) Millspaugh in Field Mus. Pub. Bot. **2**: 371. 1913, based on *Pedilanthus* sect. *Cubanthus* Boissier, DC. Prod. **15(2)**: 7. 1862. Type species: *Cubanthus linearifolius* (Griseb.) Millsp., based on *Pedilanthus linearifolius* Griseb.; designated by Millspaugh in Field Mus. Pub. Bot. **2**: 372. 1913, which choice is satisfactory since Boissier, idem, assigned but one species to his section.

Diadenaria Klotzsch & Garcke in Klotzsch in Monatsb. Akad. Berlin **1859**: 254. 1859. Type species: *Diadenaria Pavonis* Klotzsch & Garcke; chosen here. The basis of the choice is this: Of the three species assigned to the genus at the time it was published, the first, *D. involucrata*, was described from a cultivated specimen of doubtful origin, the second, *D. psilocarpa*, was never described, and the third

D. Paronis was based on a type of known origin which was extant at least till about 1913 (Millspaugh in Field Mus. Pub. Bot. **2**: 366. 1913).

HEXADENIA Klotzsch & Garcke in Klotzsch in Monatsb. Akad. Berlin **1859**: 253. 1859. Type species: *Pedilanthus macrocarpus* Bentham, is automatically the type since it was the only species said, at the time of publication, to belong to the genus.

TITHYMALOIDES C. Gomez Ortega, Tab. Bot., 28. 1783. (This may have been published earlier by the same author but the rare first edition (1773 fide Pritzel) has not been available.) Type species: *Tithymaloides myrtifolium* (L.) O. Kuntze, based on *Euphorbia Tithymaloides* L. [α] *myrtifolia* L. Kuntze cited *Pedilanthus Tithymalo*[*i*]*des* Poit. (based on *Euphorbia Tithymaloides* L.) in synonymy. The specific name "*Tithymaloides*" could not have been placed under the genus of the same name for it would have created a tautonym. It appears that Kuntze considered *Euphorbia Tithymaloides myrtifolia* L. (published as a trinomial) as nomenclatorially, and, of course, taxonomically synonymous with *Euphorbia Tithymaloides*, the oldest specific name included in this generic concept and plainly named for the genus *Tithymaloides*. Consequently it is meet that *Tithymaloides myrtifolium* (L.) Kuntze be taken as the type species of the genus *Tithymaloides*.

The vexatious problem of the validation of pre-Linnaean genera, particularly those of Tournefort, must now be considered. Many older workers obviously accepted Tournefort's pre-Linnaean publication. They logically credited a genus to Tournefort even though some other author had used the name during or after 1753. Now we demand that these genera be validated within the period of our present nomenclature beginning with 1753. The logical procedure seems to be this: If author A publishes genus X in 1783 and refers to Tournefort and author B uses genus X in 1891 and refers (in this case through author C) to Tournefort, the use of author B is not considered as a new validation but merely another use of the previously validated name. In this case Gomez Ortega 1783 refers, on the title page, to Tournefort thus: "Tabulae Botanicae in quibus synoptice exhibentur classes, sectiones, et genera plantarum in Institutionibus Tournefortianis tradita: Subjectis plurium specierum nominibus Hispanis, et quarumdam vocum technicarum explicatione." O. Kuntze, Rev. Gen. **2**: 620. 1891, refers to Ludwig, Def., 96. 1737 where the genus *Tithymaloides* is accredited to T. which obviously means Tournefort. Anyone questioning this has but to turn to the posthumous edition

of Ludwig's Definitiones by Boehmer, 81. 1760 to be convinced, for there the page reference to Tournefort is given.

TITHYMALUS Miller, Gard. Dict. ed. 4 Abridged, **3**: Tithymalus. 1754. Type species: *Tithymalus myrtifolius* Miller, Gard. Dict. ed. 8, Tithymalus 1. 1768; chosen here. The abridged ed. 4 was polynomial. The first binomial edition was the eighth, published in 1768. Included in the genus in 1754 were two species designated by polynomials. The first was: "1. TITHYMALUS *frutescens, folio myrti amplissimo. Tourn.*" (Tournefort, Institutiones **1**: 654 [564 by error]. 1700). In 1768 Miller had "1. TITHYMALUS (*My*[*r*]*tifolius*) folii ovatis acuminatis . . . Tithymaloides frutescens folio myrti amplissimo. Tourn. Inst. 654." Hence Miller himself considered his first species of 1754 identical with his first species of 1768. (The use of *Tithymalus* rather than *Tithymaloides* in the first quotation is explained by Miller, l. c., 1754: "I have applied the old Name [*Tithymalus*] to this Genus, rather than that of *Tithymaloides*." The second species was excluded in the choice of the type due to the fact that the phrase name used in 1754 differed from that cited in synonymy in 1768. From this and from the rather different diagnoses it is not certain that the second species of 1754 is intended to be exactly identical with the second of 1768. It might be possible to trace through intervening editions the evolution of the description of the second species and so demonstrate that probably the second species of both years are identical, but an easy certainty (the case of the first species) is better than a merely demonstrated probability.

Tithymalus myrtifolius Miller is generally considered identical with *Euphorbia Tithymaloides* L. which was chosen by Millspaugh in Field Mus. Pub. Bot. **2**: 353. 1913 as the type species of the genus *Pedilanthus*.

Croizat in Amer. Journ. Bot. **24**: 703. 1937, in his unfortunate resurrection of *Tithymalus* Miller, states "Type—species: Tithymalus padifolius (Poit.) comb. nov.;". Such a typification is inadmissible under the important principal that, for purposes of typification, a species assigned to a genus by its author should have preference over species assigned by other authors. The fact that the parenthetical author given by Croizat is in error is another matter which is elucidated in my article "A Miscellany of New World Euphorbiaceae" in in this same Contribution under *Pedilanthus laurocerasifolius*.

VENTENATIA Trattinnick, Gen. Pl., 86. 1802. Type species: *Ventenatia bracteata* (Jacq.) Tratt., based on *Euphorbia bracteata* Jacq.; automatically the type since it was the only species assigned.

9. PEDILANTHUS AND CNIDOSCOLUS PROPOSED FOR CONSERVATION.

By Louis Cutter Wheeler.

The two well-known euphorbiaceous genera *Pedilanthus* Necker and *Cnidoscolus* Pohl will be eliminated by the law of priority unless conserved. They should be conserved since they are widely known and used and their rejection would result in the resurrection of long neglected names. In addition their rejection would result in using names which are in current use for quite different concepts. See Sprague in the anonymous Nomenclature proposals by British Botanists (International Botanical Congress, Cambridge (England), 1930), 47–49. 1929, for criteria to be used in judging whether a given name should be conserved.

The form used in proposing these names for conservation is that used by Rehder, Weatherby, Mansfeld, and Green in their "Conservation of Later Generic Homonyms" (Kew Bull. **1935**: 341–544. 1935). One slight addition is made. The type species ("standard species" was substituted by Sprague, Kew Bull. **1926**: 96–97. 1926) is stated not only for the names proposed for conservation but also for those proposed for rejection. This is necessary in order to fix the application of the names rejected as well as of those conserved. If the basis (type species) of a rejected genus is not designated the purpose and intent of the conservation may be flouted in certain cases by a nefarious choice of type.

Mr. C. A. Weatherby has offered valuable advice which is gratefully acknowledged.

Pedilanthus Necker, Elem. Bot. **2**: 354, T. XXIX, fig. 4. 1790.

versus

Tithymalus Miller, Gard. Dict., ed. 4 abr., **3**: Tithymalus. 1754.
Tithymaloides C. Gomez Ortega, Tab. Bot., 28. 1783.
Ventenatia Tratt., Gen. Pl., 86. 1802.
Crepidaria Haw., Syn. Pl. Succ., 136. 1812.

Pedilanthus Necker. Euphorbiaceae.

Adopted by: Poiteau in Ann. D'Hist. Nat. Paris **19**: 388. 1812; H. B. K., Nov. Gen. & Sp. Pl. **2**: 63. 1817; Kunth, Synops. Pl. **1**: 391. 1822; Link, Enum. Hort. Berol. **2**: 18. 1822; Adr. Jussieu, Euphorb. Gen. Tent. 59. 1824; Hamilton, Prod. Pl. Ind. Occ., 42. 1825; Poiret in Levrault, Dict. Sci. Nat. **38**: 212. 1825; Sprengel, Syst. Veg. ed. 16, **3**: 802. 1826; Sweet, Hort. Brit. ed. 1, 355. 1827; Lindley, Introd. Nat. Syst. Bot., 105.

1830; Spach, Hist. Nat. Veg. **2**: 488. 1834; Loudon, Encyc. Pl., 406. 1836; Rafin., Fl. Tellur. **4**: 117. 1838[1]; Endl., Gen. Pl., 1108. 1840; Steudel, Nom. ed. 2, **2**: 282. 1841; Bentham, Bot. Voy. Sulphur, 49, t. 23A. 1844; Adr. Jussieu in d'Orbigny, Dict. d'Hist. Nat. **9**: 534. 1847; Schlechtendal in Linnaea **19**: 255. 1847; Baillon, Etude Gén. Euphorb., 287. 1858; Grisebach, Fl. Br. W. I., 51. 1859; Klotzsch & Garcke in Klotzsch in Monatsberichte Akad. Berlin **1859**: 253. 1859[2]; Klotzsch & Garcke in Klotzsch in Abh. Akad. Berlin, Phys., **1859**: 19, 105. 1860; Boissier in DC. Prod. **15(2)**: 4. 1862; Le Maout & Decaisne, Traité Gen. Bot., 493. 1868; Baillon, Hist. Pl. **5**: 178. 1874; Muell. Arg. in Martius, Fl. Bras. **11(2)**: 702, t. 98. 1874; L. Pfeiffer, Nomenclator Bot. **2 (1)**: 612. 1874; Bentham & Hooker, Gen. Pl. **3**: 257. 1883; Hemsley in Godman & Salvin, Biol. Centrali-Am. Bot. **3**: 88. 1882–6; Nicholson, Ill. Dict. Gard. **3**: 58. 1884–8; Durand, Index Gen. Phaner., 360. 1888; Pax in Engler & Prantl, Nat. Pflanzenfam. **3(5)**: 112. 1891; J. D. Smith in Bot. Gaz. **19**: 263. 1894; Robinson & Greenman in Amer. Journ. Sci. ser. 3, **50**: 164. 1895; J. N. Rose in Contr. U. S. Nat. Herb. **1**: 355. 1895; Millspaugh in Field Mus. Pub. Bot. **1**: 305, t. 18. 1896; Duss in Ann. L'Inst. Colon. Mars. **3**: 41. 1897 (Fl. Phaner. Antill. Fr.); Engler, Syll. Pfl. ed. 2, 142. 1898; Millspaugh in Field Mus. Pub. Bot. **1**: 375. 1898; Dalla Torre & Harms, Gen. Siphonogam. **4**: 282. 1900; Pulle, Enum. Vasc. Pl. Surinam, 264. 1906; J. R. Johnston in Contr. U. S. Nat. Herb. **12**: 108. 1908; Boldingh, Fl. Dutch W. I. Isls. **1**: 117. 1909; Velenovsky, Vergl. Morph. Pfl. **3**: 839, t. 6, fig. 6. 1910; Millspaugh, Field Mus. Pub. Bot. **2**: 353–371. 1913; Small, Fl. SE U. S. ed. 2, 1350. 1913; Gomez de la Maza & Roig in Estac. Exper. Agron. Boletin **22**: 48. 1914 (Fl. Cuba); L. H. Bailey, Standard Cycl. Hort. **5**: 2524. 1916; Millspaugh in Addisonia **1**: 47, t. 24. 1916; Britton, Fl. Bermuda, 218. 1918; Bose, Man. Ind. Bot., 130. 1920; Britton & Millspaugh, Bahama Fl., 233. 1920; Fawcett & Rendle, Fl. Jamaica **4(2)**: 346. 1920; Standley in Contr. U. S. Nat. Herb. **23**: 604. 1923; Britton & Wilson, Sci. Survey Porto Rico & Virgin Isls. **5(4)**: 496. 1924; I. M. Johnston in Proc. Calif. Acad. Sci. ser. 4, **12**: 1076. 1924; Standley & Calderon, Lista Prelim. Pl. Salvador, 135. 1925; Pittier, Man. Pl. Us. Venez., 349. 1926; Standley, Field Mus. Pub. Bot. **3**: 331. 1930; Lanjouw, Euphorb. Surinam, 186. 1931; F. Pax & K. Hoffmann in Engler & Prantl, Nat. Pflanzenfam. 2 Aufl. **19c**: 223. 1931; Standley, Field Mus. Pub. Bot. **10**: 254. 1931; Lemée, Dict. Descr. & Synon. Gen. Phaner. **5**: 94.

[1] See Barnhart, Torreya **7**: 177–182. 1907, as to date.
[2] See Hasskarl, Flora **43(1)**: 8–13. 1860, as to date.

1934; Standley in Field Mus. Pub. Bot. **18**: 617. 1937; and many other authors and works omitted for the sake of brevity.—About 35 species from Mexico, Central America, northern South America, and the West Indies.

Type species: *Pedilanthus Tithymaloides* (L.) Poit., based on *Euphorbia Tithymaloides* L., the oldest and best known of the three species assigned to the genus Pedilanthus by Poiteau, the first author to assign species. Millspaugh in Field Mus. Pub. Bot. **2**: 353. 1913, designated this as the type species.

Tithymalus Miller. Euphorbiaceae.

Adopted by: Miller, Gard. Dict. ed. 7, Tithymalus. 1759; Miller, Gard. Kalendar ed. 14, 208. 1765; Miller, Gard. Dict. ed. 8, Tithymalus. 1768; Miller, Gard. Dict. ed. 6 Abr., Tithymalus. 1771; Small, Man. SE Fl., 804. 1933; Hara in Journ. Jap. Bot. **11**: 381. 1935; Croizat in Amer. Journ. Bot. **24**: 702–4. 1937; Croizat in Philippine Journ. Sci. **64**: 400. 1938. Miller assigned two binomials to his genus in 1768. The name did not reappear until 1933 when Small assigned one more species to the genus.

Type species: *Tithymalus myrtifolius* Miller; chosen by me in the preceding article.

Tithymaloides C. Gomez Ortega. Euphorbiaceae.

Adopted by: J. E. Smith in Rees, Cyclopaedia **35**: Tithymaloides. 1817[1]; O. Kuntze, Rev. Gen. **2**: 620. 1891 (as Tithymalodes); Gomez de la Maza, Fl. Habanera, 154. 1897; Post & Kuntze, Lexicon Gen. Phaner., 562. 1904 (as *Tithymalodes*). Gomez Ortega assigned no species to the genus and none was assigned until O. Kuntze, 1891, assigned several species. Gomez de la Maza, 1897, assigned one species. The rare first edition (1773 *fide* Pritzel) of Gomez Ortega's Tabulae Botanicae has not been available. He may have validated Tournefort's genus there.

Type species: *Tithymaloides myrtifolium* (L.) O. Kuntze, based on *Euphorbia Tithymaloides* L. [α] *myrtifolia* L.; chosen by me in the preceding article.

Ventenatia Tratt. Euphorbiaceae.

While this is antedated by *Pedilanthus* Necker it is well to include *Ventenatia* Tratt here since, if Necker's "species naturales" are not to be accepted as genera, *Pedilanthus* must date from 1812. Trattinnick assigned but one species to *Ventenatia* and the genus has lapsed into disuse.

Type species: *Ventenatia bracteata* (Jacq.) Tratt., based on *Euphorbia bracteata* Jacquin; automatically the type since it was the only species assigned.

[1] See B. D. Jackson in Journ. Bot. Brit. **34**: 307–311. 1896 as to date.

Crepidaria Haw. Euphorbiaceae.

This is included for the same reason as *Ventenatia*. *Crepidaria* is an illegitimate name since *Tithymalus* Miller was cited in synonymy. Haworth assigned 3 species to the genus *Crepidaria* when he published it, and one more, Suppl. Pl. Succ., 67. 1819, after which the genus lapsed. It may be well to note that Haworth, idem, made the mistake of crediting *Tithymalus* [Tournefort] to Miller while he still cited *Tithymalus* Miller above in synonymy under *Crepidaria*.

Type species: *Crepidaria myrtifolia* (Miller) Haw., based on *Tithymalus myrtifolius* Miller; chosen by me in the preceding article.

The genus *Pedilanthus* has been almost universally accepted in botanical literature. It is also well established in horticulture. *Tithymalus* Miller not only is not established but unfortunately is identical in spelling with the traditional *Tithymalus* of Tournefort which was first validated in post-Linnaean times by Hill, British Herbal, 148. 1756. Hill made no reference to Tournefort. Aside from being twice preoccupied Hill's genus was nomenclatorially valid for he drew a distinction between the succulent members of *Euphorbia*, *sensu stricto*, and the herbaceous species and did not substitute *Tithymalus* for *Euphorbia*. However, Hill included several members of *Euphorbia* subgenus *Chamaesyce* in his *Tithymalus*. Several perplexities in regard to the use of *Tithymalus* in the common sense equivalent to *Euphorbia* section *Tithymalus* are evident but their solution will be left for those who wish to maintain the group as a genus. (Scopoli, Meth. Pl., 8. 1754 (Mar. 26), defines "Tithymalus &c.". The "&c." as elucidated from the context, indicates that more than one genus was meant. Duhamel, Traité des Arbres **2**: 339, pl. 97. 1755, used *Tithymalus* [Tourn.] but was using it as the equivalent of *Euphorbia* L. as shown by his citation of that genus in synonymy, thereby invalidating *Tithymalus* Duhamel. Either Adanson (Fam. Pl. **2**: 355, 611. 1763) or Scopoli (Fl. Carn. ed. 2, **1**: 332. 1772) is generally cited as the post-Linnaean author of *Tithymalus* [Tourn.]. Both invalidated their publications in the same way that Duhamel invalidated his by citing *Euphorbia* L. as an unqualified synonym. Several hundred species have been assigned to the traditional *Tithymalus* which genus has been accepted by the majority of authors who confine *Euphorbia* to the cactoid species. The adoption of *Tithymalus* Miller will not only displace two genera (*Tithymalus* Hill and *Pedilanthus* Necker) well-established in literature, but will cause endless confusion in indices. Even Index Kew. Suppl. **7**: 242. 1929; **8**: 239.

1933, fell into the error of placing all the species of *Tithymalus* Hill under *Tithymalus* Miller where none of them belonged. If *Tithymalus* Miller is adopted it follows inevitably that authors using the genera segregated from *Euphorbia* must transfer the species of *Tithymalus* Hill to the next available genus. Incidentally, the next available genus is *Keraselma* Necker (1790), not *Galarhoeus* or *Esula* Haw. (1812).

Neckers "genera" have been challenged both on the ground that they were called "species naturales" and, that since no species were assigned and the diagnoses were often of doubtful application, these genera could not be identified. The first objection has not been generally accepted since the entities defined were obviously genera. The second objection may be valid in some cases but in the case of *Pedilanthus*, *Keraselma*, and *Athymalus* it is easy to demonstrate by parallel phraseology what figures apply to each genus and their identity is then clear.

Cnidoscolus Pohl, Pl. Brasil. Icon. & Descr. **1**: 56. 1827. versus
Jussieuia Houston, Reliquiae Houstonianae, 6, t. 15. 1781, not
Jussiaea L., 1753.
Bironea Rafin. in Specchio delle Scienze **1**: 156. 1814.
Mesandrinia Rafin., Neogenyton, 3. 1825.

Cnidoscolus Pohl. Euphorbiaceae.

Adopted by: Reichenbach, Consp. Reg. Veg., 195. 1828; Bartling, Ord. Nat. Pl., 371. 1830; Sprengel, L. Gen. Pl. ed. 9, **2**: 547. 1831; Spach, Hist. Nat. Veg. Phaner. **2**: 487. 1834; Endl., Gen. Pl., 1114. 1840[1]; Endl., Ench. Bot., 588. 1840; Reichenbach, Repert. Herb. Nom., 194. 1841; Meisner, Pl. Vasc. Gen. **1**: 341. 1841, **2**: 253. 1841[2]; Miquel in Linnaea **18**: 749. 1844; Engelm. & Gray in Boston Journ. Nat. Hist. **5**: 234. 1845 (Pl. Lindh., 26); Lindley, Veg. Kingd., ed. 2, 281. 1847[3]; Lindley, Veg. Kingd., ed. 3, 281. 1853[4]; A. Gray, Man. Bot., ed. 2, 389. 1856; A. Gray, Man. Bot., Rev. ed., 389. 1857; idem, 1858; Baillon, Étude Gén. Euphorb., 302. 1858; Torrey in Emory, U. S. & Mex. Bound. Survey **2**(**1**): 198. 1859; A. Gray, Man. Bot., Rev. ed., 389. 1859; A. Wood, Classbook Bot., 630. 1861; A. Gray, Man. Bot., Rev. ed. 3, 389. 1862; A. Gray, Man. Bot., Rev. ed. 4, 389. 1863; idem, 1864; idem, 1865; idem, 1869; Baillon in Adansonia **4**: 274. 1863–4; Chapman, Fl. Southern

[1] Date given by Asa Gray in front of copy at the Gray Herbarium; also given by Pfeiffer, Nom. Bot. **1**(**1**): 798. 1873.
[2] Date given by Pfeiffer, idem.
[3] Really the first edition under this title, see p. x.
[4] Really the second edition under this title, see p. x.

U. S., 409. 1865; A. Wood, Classbook Bot., 630. 1865; idem, 1866; idem, 1870; idem, 1877; idem, 1881; Chapman, Fl. Southern U. S., ed. 2, 409. 1883; Small, Fl. SE. U. S., 706, 1333. 1903; Rose in Contr. U. S. Nat. Herb. **12**: 282. 1909; Small, Fl. SE. U. S., ed. 2, 706. 1913; Britton & Brown, Ill. Fl., ed. 2, **2**: 462. 1913; Arthur in Torreya **21**: 11. 1921; I. M. Johnston in Contr. Gray Herb., n. s., **68**: 85. 1923; F. Pax & K. Hoffmann, Pflanzenreich IV. **147(17)**: 193. 1924; I. M. Johnston in Proc. Calif. Acad. Sci., ser. 4, **12**: 1060. 1924; F. Pax & K. Hoffmann in Engler & Prantl, Nat. Pflanzenfamilien, 2 Aufl., **19c**: 164. 1931; Cory & Parks in Texas Agr. Exper. Station Bull. **550**: 64. 1938.[1] —About 50 species in tropical America.

Type species: *Cnidoscolus hamosus* Pohl; chosen by Small in Britton & Brown, Ill. Fl., ed. 2, **2**: 462. 1913.

Jussieuia Houston. Euphorbiaceae.

This genus seems to have been adopted by no author except the original. If it is not excluded on the ground that it is a mere variant spelling of *Jussiaea* (used by L., 1753, to designate a genus of the Onagraceae) it should be rejected on the ground of disuse.

Type species: *Jatropha herbacea* L.; the only species mentioned at the time of publication.

Bivonea Rafin. Euphorbiaceae.

Adopted by: Rafin., Fl. Ludoviciana (Suppl.), 138. 1817; Rafin. in Journ. Phys. Chem. Hist. Nat. **89**: 260. 1819; Rafin. in Amer. Mo. Mag. **2**: 268. 1818; House in N. Y. State Mus. Bull. **233–234**: 61. 1921; Arthur in Torreya **22**: 30. 1922.

Type species: *Bivonea stimulosa* (Michaux) Rafin., based on *Jatropha stimulosa* Michaux; automatically the type since it was the only species assigned to the genus at the time it was published.

Mesandrinia Rafin. Euphorbiaceae.

Adopted by no author except the original. Proposed as a direct substitute for *Bivonea* Rafin.: "Offered as substitute to my *Bivonea*, of 1814, another G. having since received the same name, if mine, although previous, is to be changed."

Type species: The same as for *Bivonea* Rafin.

Since *Cnidoscolus* Pohl has been widely used in both monographic and floristic works and the conflicting genera have had very little use, the conservation of *Cnidoscolus* is recommended. *Bivonea* Rafin. also conflicts with *Bivonaea* DC. which was proposed, Kew Bull. **1935**: 378–9. 1935, for conservation but no case was made since the references given left *Bivonea* Rafin. a *nomen nudum* and *Bivonia* Sprengel was not shown to have been published earlier than *Bivonaea* DC.

[1] Published Jan. 18, 1938, fide Cory in letter filed at the Gray Herbarium.

Explanation of Plates.

Plate I.

Fig. 1. Desmodium Vargasianum B. G. Schubert (*Vargas 769*), portion of stem with leaves and raceme showing the type of pubescence on each × 1.
Fig. 2. Same, flower × 1½.
Fig. 3. Same, calyx × 2½.
Fig. 4. Same, immature loment × 1½.
Fig. 5. Same (*Killip & Smith 22415*), mature loment × 2.
Fig. 6. Lamourouxia dependens Benth. (*Skinner*), section of flowering branchlet × 1.
Fig. 7. Same, corolla laid open × 1.
Fig. 8. Lamourouxia dependens, var. apiculata Hunnewell & Smith (*Skutch 154*), corolla laid open × 1.
Fig. 9. Lamourouxia montana Hunnewell & Smith (*Hunnewell 14856*), apex of flowering branchlet × 1.
Fig. 10. Same corolla laid open × 1.
Fig. 11. Lamourouxia stenoglossa Hunnewell & Smith (*Ghiesbreght 706*), apex of flowering branchlet × 1.
Fig. 12. Same, corolla laid open × 1.

Plate II.

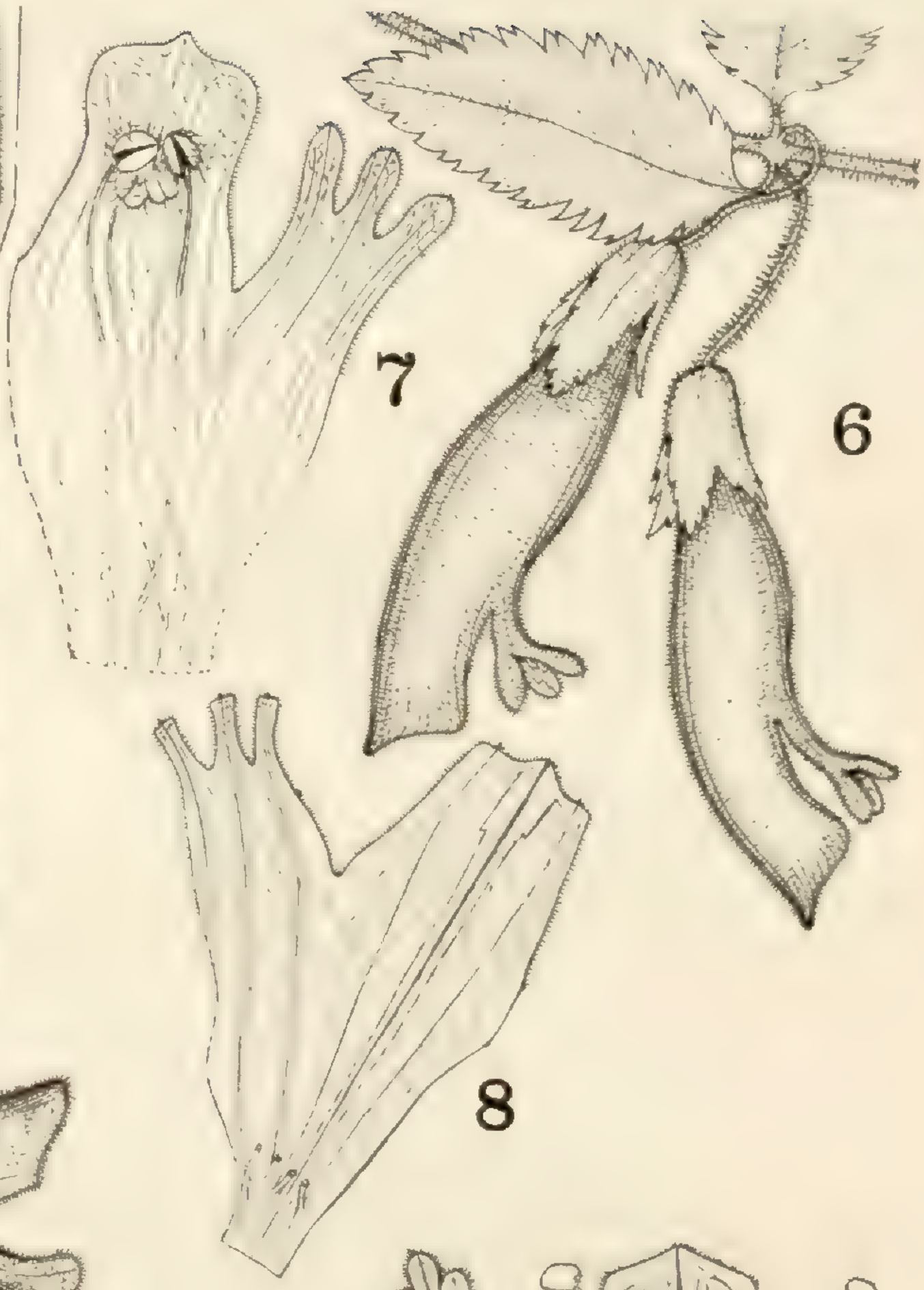
Fig. 1. Tillandsia Maxoniana L. B. Smith (*Buchtien 4538*), inflorescence × ½.
Fig. 2. Same, apex of leaf × ½.
Fig. 3. Same, expanded sepal × 1.
Fig. 4. Heliconia Cardenasii L. B. Smith (*Cardenas 2059*), leaf and inflorescence × 1/5.
Fig. 5. Same, flower × 1.
Fig. 6. Same, diagrammatic section of the base of the perianth to show the staminode × 5.
Fig. 7. Heliconia Griggsiana L. B. Smith (*Pennell 9085*), bract and axillary flowers × ½.
Fig. 8. Same, flower × 1.
Fig. 9. Same, unpaired exterior tepal × 1.
Fig. 10. Same, diagrammatic section of the base of the perianth to show the staminode × 5.

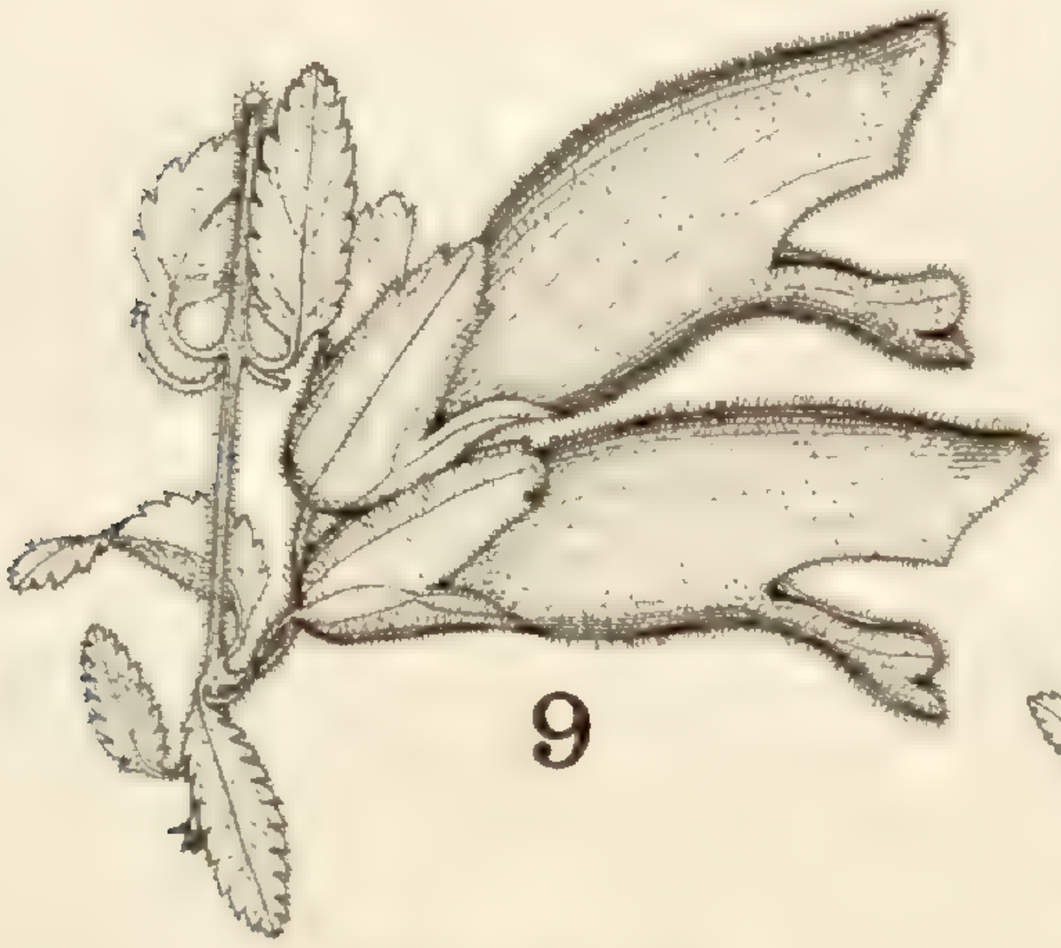
Plate III.

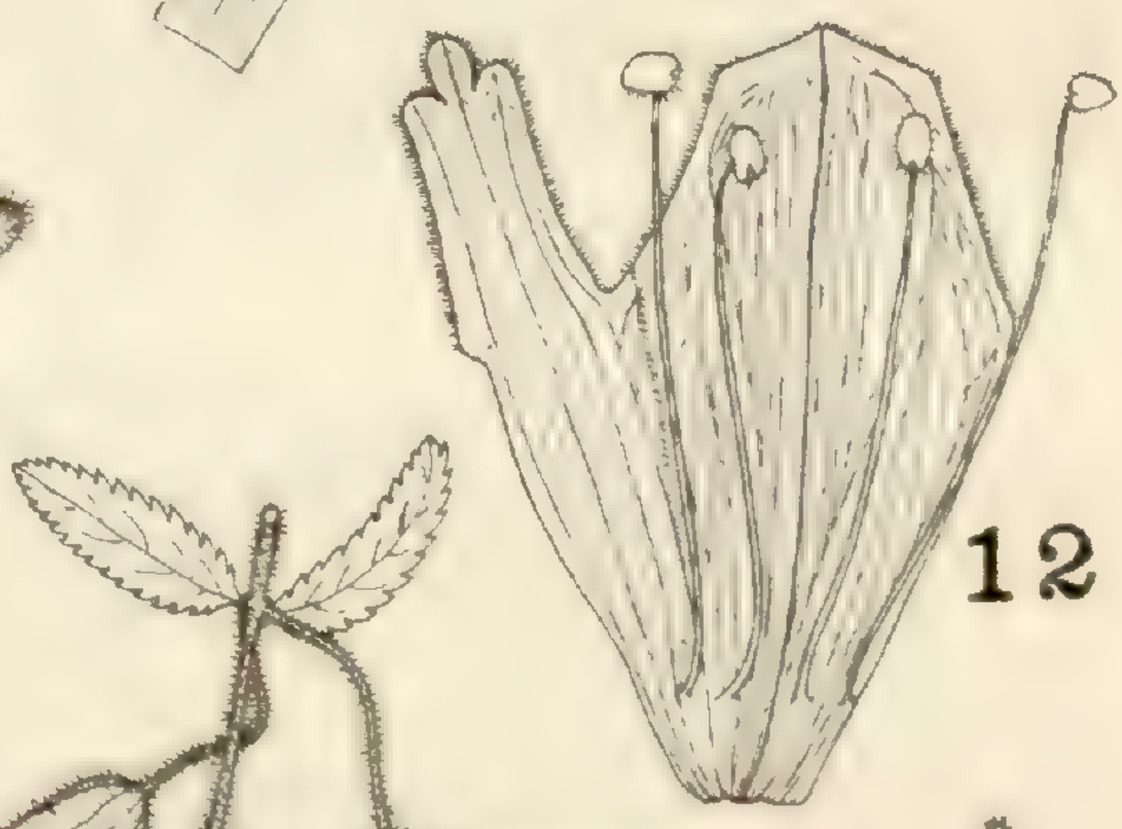
Aechmea subpetiolata L. B. Smith (*Sneidern 1593*), habit.

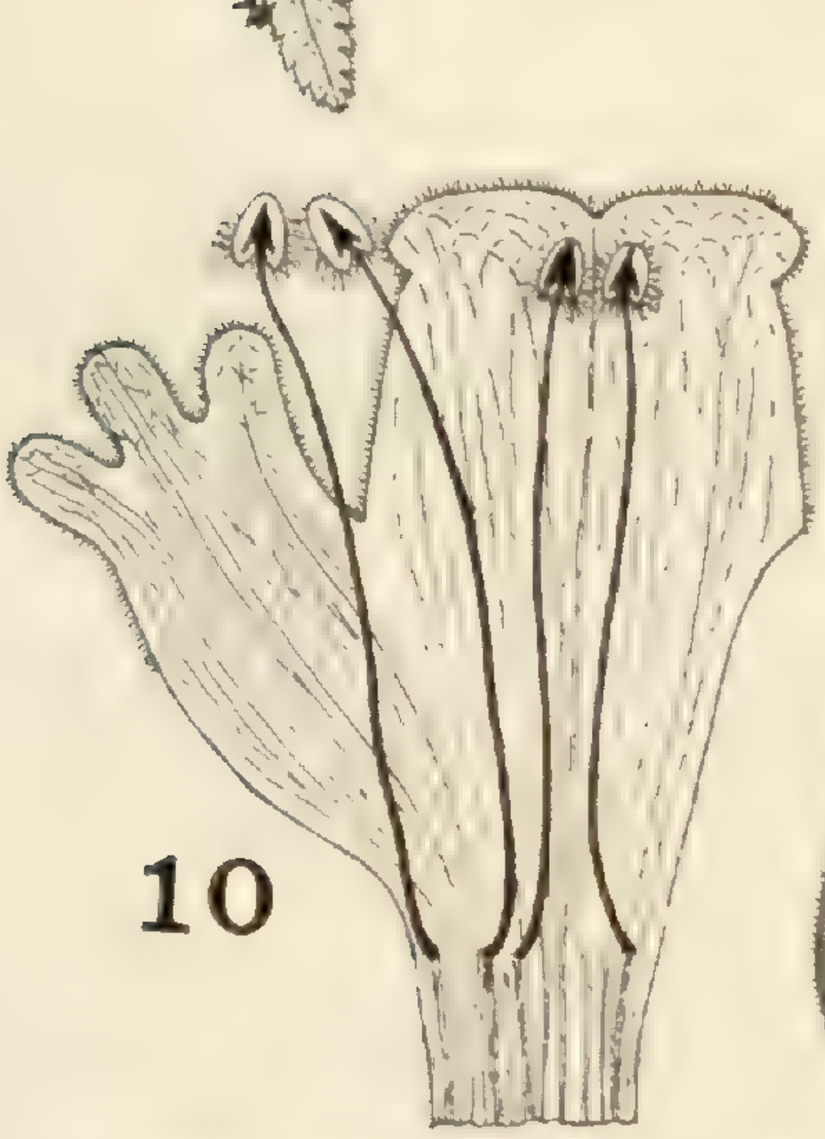
Plate IV.

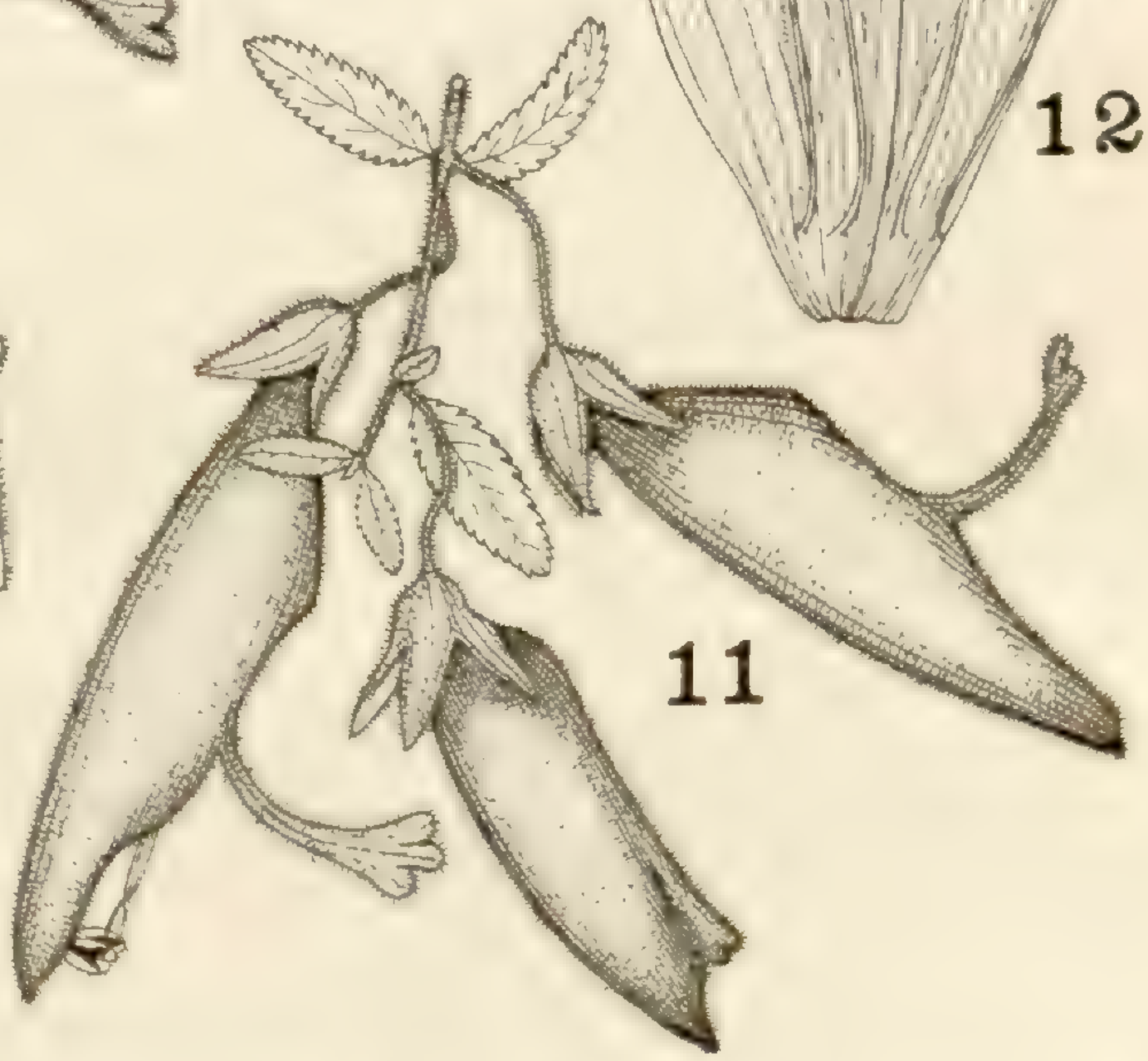
Acrostichum lanuginosum Willd. His illustration, left; type specimen, right. The base of the stipe is not shown; it has a conspicuous tuft of scales, as in the drawing.



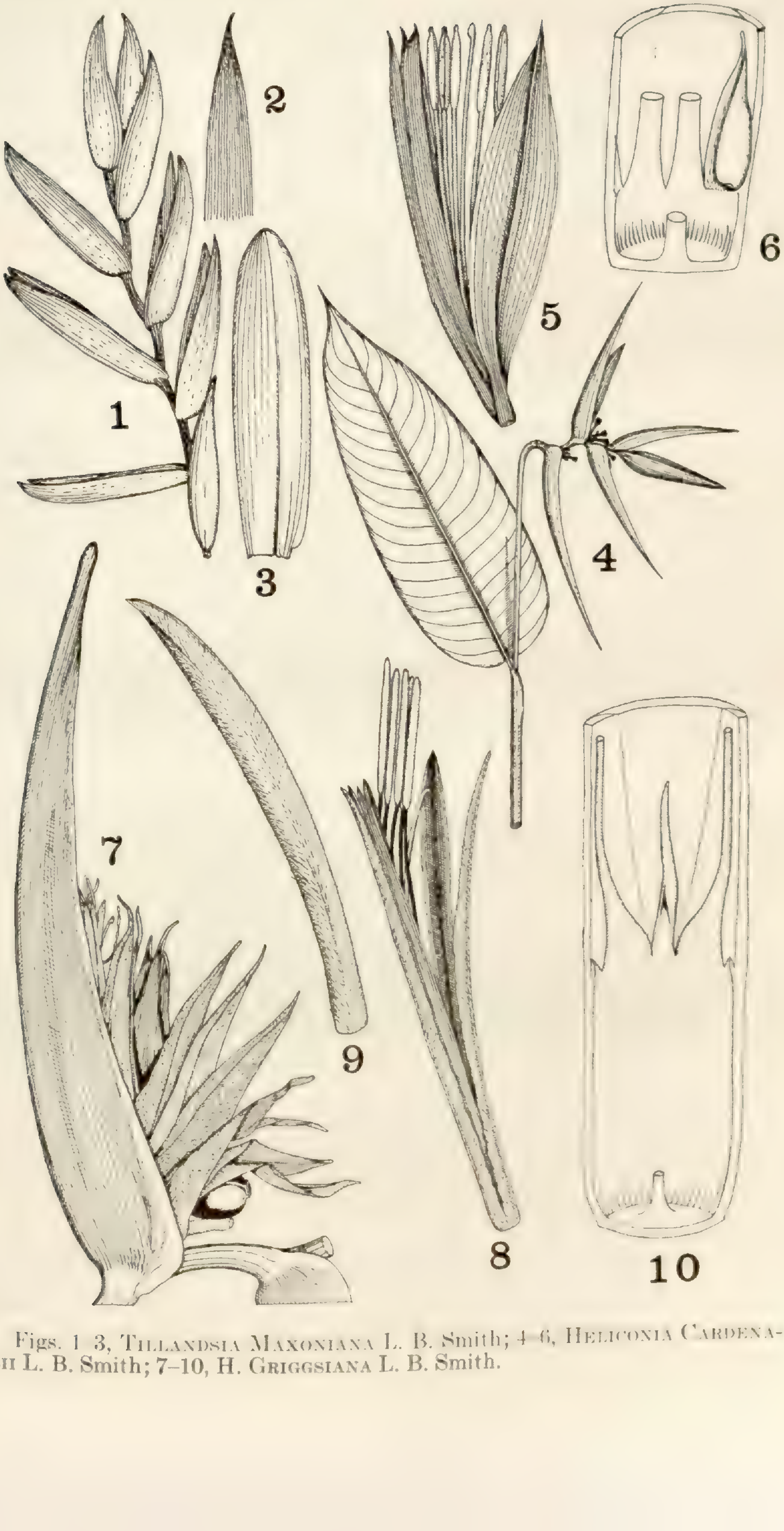








Figs. 1–5, DESMODIUM VARGASIANUM B. G. Schubert; 6 7, LAMOUROUXIA DEPENDENS Benth.; 8, L. DEPENDENS, var. APICULATA Hunnewell & Smith; 9–10, L. MONTANA Hunnewell & Smith; 11–12, L. STENOGLOSSA Hunnewell & Smith.



Figs. 1–3, TILLANDSIA MAXONIANA L. B. Smith; 4–6, HELICONIA CARDENASII L. B. Smith; 7–10, H. GRIGGSIANA L. B. Smith.

AECHMEA SUBPETIOLATA L. B. SMITH.

Acrostichum lanuginosum Willd. His illustration, left; type specimen, right.

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CXXV

THE NORTH AMERICAN SPECIES OF CROTALARIA

HAROLD A. SENN

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THE NORTH AMERICAN SPECIES OF CROTALARIA

HAROLD A. SENN*

CROTALARIA L. is a widespread pantropic genus with its center of major development in tropical Africa. The whole genus includes possibly 400 species of which over 300 occur in Africa. These African species have been thoroughly and comprehensively treated by Baker f. (Journ. Linn. Soc. **42**: 241–425. 1914). Baker reviewed the early history of the genus and discussed its classification and delimitation from the closely related genus *Lotononis*. Problems of generic delimitation do not arise in treating the American material since none of the closely related genera occur here. There has been no comprehensive conspectus of the species of the genus occurring in United States, Mexico, Central America and the West Indies. Groups as well as single species from this region have been described especially by Humboldt, Bonpland and Kunth, by Bentham, by Hooker and Arnott, later by Rose and others. The West Indian species have been enumerated by Grisebach, Flora of the British West Indies, 1859, and, in part, by Fawcett and Rendle, Flora of Jamaica, **4**. 1920. On the mainland the northern United States species have been described by Robinson and Fernald in Gray's Manual, ed. 7, 1908, and the southern forms by Small, Manual of the Southeastern Flora, 1933. In Mexico the only recent enumeration has been Standley's (Contr. U. S. Nat. Herb. **23**: 1922) list of the nine fruticose species.

* Formerly United States National Research Council Fellow in Botany at Harvard University.

In classifying the genus Baker's major divisions into simple-leaved (*Simplicifoliae* Benth.) and multifoliolate forms has been followed. Only one of Baker's multifoliolate sections occurs in the region under discussion, Section *Eucrotalaria* Baker f. For the most part it has not been possible to follow Baker's subsectional limitations in dealing with the American species of *Eucrotalaria*, since the range of flower-sizes did not permit of even moderately sharp divisions. Nevertheless two species, *C. lotifolia* L. and the closely related *C. Purdiana* Senn, characterized by short axillary racemes, clearly belong in Baker's subsection *Oliganthae*.

In the present paper thirty-one species of *Crotalaria* are recognized. These include ten introduced species (*C. Berteriana* DC., *C. verrucosa* L., *C. spectabilis* Roth, *C. retusa* L., *C. juncea* L., *C. tetragona* Roxb., *C. quinquefolia* L., *C. mucronata* Desv., *C. usaramoensis* Baker f. and *C. nana* Burm. f.), most of which are natives of India and the Asiatic tropics. *C. usaramoensis*, Baker f. is an African species cultivated in Florida and locally escaped. The American distribution of these introduced species is largely limited to the West Indies and the southeastern United States. Of the remaining twenty-one species one, *C. incana* L. is a widespread tropical weed, native to America but now common throughout the Old World tropics as well. *Crotalaria pumila* Ortega is another species which tends to become a weed and presents a wide range of variability.

The most difficult group in which to delimit the species is that centering around *C. sagittalis* L., another species which easily becomes established on disturbed ground and thus may tend to become a weed. In Virginia and North Carolina it is simply and rather sharply delimited from its congeners, *C. angulata* Mill. and *C. Purshii* DC., but when specimens from the whole of the range of *C. sagittalis* L. are studied there is seen to be a series of intergrading forms showing its close relationship with *C. Tuerckheimii* Senn, *C. pilosa* Mill., *C. stipularia* Desv. and *C. maritima* Chapm., as well as *C. Purshii* DC. and *C. angulata* Mill. The stipules vary markedly in size and shape; the pubescence ranges from closely appressed to definitely spreading and from white to tawny yellow; the habit varies from erect to procumbent and from herbaceous to suffruticose. A study of a large number of specimens of this group has resulted in the key presented below which attempts to delimit the species as accurately as possible. This complex should be thoroughly studied from the cytotaxonomic

and cytogenetic approach in order to make out more clearly the evolutionary relationships and natural limits of the species.

Certain species, especially *C. stipularia* Desv., *C. vitellina* Ker, *C. maypurensis* HBK., *C. anagyroides* HBK. and perhaps *C. nitens* HBK., are predominantly South American, reaching northward limits of their range in the region considered. Certain other species, such as *C. bupleurifolia* Schlecht. & Cham., *C. eriocarpa* Benth., *C. mollicula* HBK., *C. longirostrata* Hook. & Arn. and *C. filifolia* Rose, are probably limited to Central America or even in some instances to Mexico.

Material Studied

The *Crotalaria* material at the Gray Herbarium of Harvard University has been the basis for this study. All the material in the herbarium of the Arnold Arboretum has also been examined. The specimens from the region under consideration in the herbarium of the New York Botanical Garden and in the United States National Herbarium were examined and critical material borrowed for special study. A large loan from the Field Museum of Natural History was also examined. Type specimens have also been borrowed or photographs secured from the herbaria of the following institutions: British Museum of Natural History; The Royal Botanic Gardens, Kew; Botanical Museum, Stockholm; Jardin Botanique de l'État, Brussels; and the Muséum National d'Histoire Naturelle, Paris.

In the citations below specimens not otherwise designated are in the Gray Herbarium. The following abbreviations have been used: A, Arnold Arboretum; B, Jardin Botanique de l'État, Brussels; F, Field Museum of Natural History; G, Gray Herbarium; K, The Royal Botanic Gardens, Kew; NY, The New York Botanical Garden; P, Muséum National d'Histoire Naturelle, Paris; S, Botanical Museum, Stockholm; US, The United States National Herbarium.

Acknowledgements

I am grateful to the United States National Research Council for the grant which made this study possible and for the opportunity of collecting material in Cuba in 1938. For the opportunity of collecting material in Cuba in 1937 I am grateful to Dr. Thomas Barbour, Custodian of the Atkins Institution of the Arnold Arboretum. I am indebted to Professor E. D. Merrill for much helpful criticism and advice, and to Professor M. L. Fernald and the staff of the Gray

Herbarium for the splendid facilities afforded me there. Finally I am under especial obligation to those in charge of the institutions listed above for permitting me to examine specimens and for loaning me specimens and providing photographs of special material.

Crotalaria [Dillenius ex Linnaeus, Gen. Pl. ed. 1, 218. 1737 pro parte]; Linnaeus, Sp. Pl. 714. 1753, pro maxima parte; Endlicher, Genera, 1262. 1836–40, pro parte; Bentham and Hooker f. Gen. Pl. **1**: 479. 1865; Taubert in Engler and Prantl, Nat. Pflanzenfamilien **3**(3): 226–230. 1893; Dalla Torre and Harms, Gen. Siphon. 225. 1907; Baker f. in Journ. Linn. Soc. **42**: 251. 1914. *Atolaria* Necker, Elem. **3**: 31. 1790. *Clavulium* Desvaux in Ann. Sci. Nat. **9**: 407. 1826. *Chrysocalyx* Guillemin et Perrottet, Fl. Senegamb. Tent. 157. t. 43. 1830–33. *Cyrtolobum* R. Br. in Wallich, List, No. 5432. 1832. *Anisanthera* Rafinesque, Fl. Tellur. **2**: 60. 1836. *Crotalaria*, subg. *Iocaulon* Rafinesque, New Fl. N. Amer. **2**: 53. 1837. *Maria-Antonia* Parlatore, Maria-Antonia, Nov. Gen. Legum. 3. 1844. *Quirosia* Blanco, Fl. Filip. ed. 2, 398. 1845. *Phyllocalyx* A. Richard, Tent. Fl. Abyss. **1**: 160. 1847.

Key to the Species

A. Leaves all simple. Sect. Simplicifoliae Benth. . . . . B.
  B. Stipules when present not decurrent on the stem . . . . C.
    C. Diffuse herb, up to 4 dm. high; leaves small, 2 cm. or less long; inflorescence a capitate raceme (Asia, introduced in the West Indies) . . . . . 1. *C. nana.*
    C. Erect herbs or subshrubs, usually more than 4 dm. high; leaves larger, 3 cm. or more long; inflorescence a simple or compound raceme . . . . D.
      D. Legume short, sessile, 3–4-seeded, enclosed within the calyx; inflorescence a compound raceme; back of the standard densely pubescent (Asia, introduced in the West Indies) . . . . . 2. *C. Berteriana.*
      D. Legume elongate, stipitate, many-seeded, not enclosed by the calyx; inflorescence a terminal simple raceme; back of the standard glabrous or pubescent only along the chief vein . . . . E.
        E. Leaves broadly ovate to semi-hastate; flowers blue; young stems flexuous; stem 4-angled (widespread in the tropics, introduced in the West Indies). 3. *C. verrucosa.*
        E. Leaves elliptic or oblong to linear; flowers yellow or yellowish-red; stems terete or striate, never flexuous . . . . F.
          F. Calyx essentially glabrous; stipules broad, ovate; bracts broadly ovate, persistent (Asia, introduced into the West Indies and southern United States) . . . . . 4. *C. spectabilis.*
          F. Calyx more or less pubescent; stipules minute, setaceous or lacking; bracts linear or subulate . . . . G.
            G. Calyx-lobes broadly ovate, slightly pubescent; calyx-tube campanulate, broadly truncate at the base; carina rounded, short; leaves obovate, obtuse, glabrous above, short-pubescent beneath, not margined nor re-

curved (widespread in the tropics, introduced into the southern United States).....5. *C. retusa.*

G. Calyx-lobes linear to lanceolate, densely pubescent; calyx-tube funnel-shaped, attenuate at the base; carina sharp-angled, attenuate; leaves oblong to linear, pubescent above and beneath, margined or slightly recurved....H.

H. Bracts and bractlets conspicuous, linear; calyx-lobes 1–2 times the length of the calyx-tube; beak of the carina short, attenuate; legume essentially glabrous; leaves and branches densely pubescent; stem essentially terete (Central and South America).....6. *C. nitens.*

H. Bracts small, subulate; bractlets small, setaceous; calyx-lobes 3–4 times the length of the calyx-tube; beak of the carina long, attenuate; legume short-tomentose; leaves and branches slightly pubescent.

Leaves small (6–10 cm. long), densely pubescent; legumes light-brown; stems marked with numerous striae (Asia, introduced in America).....7. C. *juncea.*

Leaves large (10–30, mostly 14–30 cm. long), densely pubescent; legumes dark-brown; stems 4-angled (Asia, introduced in America).....8. *C. tetragona.*

B. Stipules when present decurrent on the stem (American species)....I.

I. Annual; upper part of the stem narrowly and equally winged (South America, Central America, West Indies).....9. *C. pilosa.*

I. Annual or perennial; stem free from wings or unequally winged by decurrent stipules or stipular bracts....J.

J. Inflorescence subtended by broad decurrent stipular bracts (Mexico).....10. *C. bupleurifolia.*

J. Stipular bracts absent; decurrent stipules variable, rarely completely absent, their apices acute or falcate....K.

K. Stipules large, decurrent on the stem, their apices falcate (South America and the West Indies). 11. *C. stipularia.*

K. Stipules variable, in some instances completely absent, when present narrowly decurrent on the stem, their apices acute but never falcate....L.

L. Pubescence spreading, hirsute (except *C. Tuerckheimii* var. *macrantha*)....M.

M. Plant erect, annual or perennial; leaves narrowly ovate to linear; stipules usually present, triangular, decurrent on the stem; racemes 2–4-flowered.

Usually annual; leaves narrowly ovate or lance-ovate; bracts narrowly lanceolate, sessile; corolla approximately equal to the calyx (Central America)....12. *C. Tuerckheimii.*

Annual or perennial; leaves variable, lanceolate to linear; bracts ovate-lanceolate, slender-stalked; corolla usually exceeding the calyx (North, Central and South America and the West Indies).....13. *C. sagittalis.*

M. Plant decumbent, perennial; leaves ovate, elliptic or orbicular; stipules small or absent; racemes usually 3–6-flowered (Southeastern United States, Mexico and Guatemala) . . . 14. *C. angulata.*

L. Pubescence appressed, sericeous.

Plant erect; leaves lanceolate to linear; stipules usually present, decurrent on the stem; racemes usually 4–6-flowered (Southeastern United States and Mexico) . . . . . 15. *C. Purshii.*

Plant decumbent, spreading from a woody root; leaves variable, ovate to linear; stipules usually small or absent; racemes usually 2–4-flowered (Southeastern United States, Mexico and West Indies) . . . . . 16. *C. maritima.*

A. Leaves for the most part palmately 3- to multi-foliolate.

Sect. EUCROTALARIA Baker f. . . . N.

N. Leaves variable, the lower simple, the upper trifoliolate (Cuba) . . . . . 17. *C. Urbaniana.*

N. Leaves uniformly trifoliolate or 5-foliolate . . . . O.

O. Leaves 5-foliolate throughout (Asia, introduced into the West Indies) . . . . . 18. *C. quinquefolia.*

O. Leaves 3-foliolate throughout . . . . P.

P. Inflorescence short, axillary; legume attenuated towards the base . . . . Q.

Q. Inflorescence few-flowered (1–3 flowers); leaves glabrous above (West Indies) . . . . . 19. *C. lotifolia.*

Q. Inflorescence several-flowered (4–8 flowers); leaves hirtellous above (Colombia and Cuba) . . . . . 20. *C. Purdiana.*

P. Inflorescence long, terminal, subterminal or opposite the leaves; legume not attenuated at the base . . . . R.

R. Legume densely tomentose with spreading hairs (except in *C. incana* var. *nicaraguensis*).

Annual; herbaceous; calyx very deeply lobed, the tube almost lacking; petiole longer than the terminal leaflet; leaflets oval to obovate or orbicular; bracts setaceous (widespread in the tropics) . . . . . 21. *C. incana.*

Annual or perennial; suffruticose to fruticose; calyx lobed but a definite tube present; petiole equalling or shorter than the terminal leaflet; leaflets elliptic to oblong; bracts subulate.

Erect, tall (1.5–3.0 m. high) branches drooping; fruticose; racemes long (17–50 cm. or more); flowers large (carina 1.3–2.0 cm. long); wings shorter than the carina; bracts large (6–10 mm. long) (Mexico) . . . . . 22. *C. eriocarpa.*

Erect, short (0.2–0.5 m. high); spreading habit; annual or suffruticose; racemes short (5–15 cm. long); flowers small (carina 1.2 cm. or less long); wings approximately equalling the carina; bracts small (2–6 mm. long) (Central America) . . . . . 23. *C. mollicula.*

R. Legume appressed-pubescent, puberulous, or rarely glabrous . . . . S.

S. Calyx-lobes shorter than, equalling or slightly longer than the calyx-tube . . . . T.

T. Leaflets large (3.5–10 cm. long); carina rounded; rostrum short, stout; legume

long (3.5–4.0 cm.), puberulous to glabrous.

Leaflets elliptic to obovate; calyx narrow, pubescent, teeth longer than the tube; carina striate with purple to brown markings (widespread in the tropics, introduced in southeastern United States, Central America, and the West Indies) 24. *C. mucronata.*

Leaflets elliptic; calyx broad, campanulate, membranaceous, glabrous, teeth shorter than the tube; carina not striate (Africa, introduced into Florida) .25. *C. usaramoensis.*

T. Leaflets small (0.7–3.5 cm. long); carina bent at a sharp right angle; rostrum long, attenuate; legume short (1.0–3.0 cm. long), puberulous.

Erect; tall (0.6–1.5 m. high); leaflets mostly elliptic or slightly obovate; flowers large (rostrum of carina 1.3–1.5 cm. long); back of the standard glabrous except for a few hairs along the mid-vein (Central America) .....26. *C. longirostrata.*

Erect or decumbent; short (4–30 cm. high); leaflets obovate to oblong; flowers small (rostrum of the carina 0.6–1.1 cm. long); back of the standard pubescent at the tip (Southern United States, Central America, the West Indies, and South America) .....27. *C. pumila.*

S. Calyx-lobes considerably longer than the calyx-tube....U.

U. Herbs up to about 1 m. high; leaflets linear, acuminate, usually about 6–20 times as long as broad; flowers small (carina less than 1 cm. long); pods small (1.3–1.8 cm. long) (Mexico) .....28. *C. filifolia.*

U. Herbs or shrubs up to about 3 m. high; leaflets ovate-elliptic to elliptic-lanceolate (rarely obovate or elliptic-obovate), usually 2–6 times as long as broad; flowers large (carina 1 cm. or more long); legumes large (2–4 cm. long)....V.

V. Tall herbs; petiole equalling or longer than the terminal leaflet; leaflets ovate-elliptic (rarely obovate or elliptic-obovate), 2.0–7.0 cm. long by 1.0–3.5 cm. broad; inflorescences mostly opposite the leaves; inner margin of the carina slightly pubescent; apex of the carina usually mottled with brown markings (Central America and Cuba) .....29. *C. vitellina.*

V. Shrubs; petiole shorter than the terminal leaflet; leaflets elliptic or elliptic-lanceolate, 1.5–11.5 cm. long by 0.3–3.0 cm. broad; inflorescences mostly terminal or subterminal; inner margin of the carina not mottled.

Upper branches usually slender, tending

to be terete; leaflets narrowly oblong to elliptic-lanceolate, 1.5–6.5 cm. long (av. 4.0 cm.) by 0.3–1.5 (–1.8) cm. broad (av. 0.6 cm.); under surface of the leaf puberulous; flowers distant on the racemes (Central America and Cuba).....30. *C. maypurensis.*

Upper branches usually coarse, tending to be striate; leaflets elliptic, 3.0–11.5 cm. long (av. 6.0 cm.) by 1.2–3.0 cm. broad (av. 2.2 cm.); under surface of the leaf hirtellous; flowers closely crowded on the raceme (South America and locally in Central America and the West Indies).....31. *C. anagyroides.*

Section Simplicifoliae Benth.

1. Crotalaria nana Burm. f. Fl. Ind. 156. t. 48. f. 2. 1768; Grisebach, Fl. Brit. West Ind. 179. 1859; Baker f. in Hook. f. Fl. Brit. Ind. **2**: 71. 1876; Fawc. & Rend. Fl. Jam. **4**: 10. 1920.—Type Locality: "India." Distribution: India, Burma, Ceylon; introduced in Jamaica.

I have seen no specimen of *Crotalaria nana* from North America but it is listed by Wilson (Fl. Jam. in Sawkins, Rep. Geol. Jam. 263. 1869) and Fawcett and Rendle l. c. cite as well a collection by Wullschlaegel.

2. C. Berteriana DC. Prod. **2**: 127. 1825. *C. fulva* Roxburgh, Hort. Beng. 54. 1814, *nomen nudum*, Fl. Ind. ed. 2, **3**: 266. 1832; Grisebach, Fl. Brit. West Ind. 179. 1859; Baker f. in Hooker f. Fl. Brit. Ind. **2**: 80. 1876; Fawc. & Rend. Fl. Jam. **4**: 9. 1920. *C. grandis* Baker in Hook. f., Fl. Brit. Ind. **2**: 80. 1876, in syn.—Type Locality: "in Guadalupae hortis culta." Distribution: India, Ceylon, Java, Sumatra; introduced in Hawaii and very locally in the West Indies. Jamaica: near Hope Mines, *Harris 6825*, alt. 270 m. (A, F); no collector given, *Grisebach, Fl. W. Ind.*; Short Wood, *Campbell 6243*, alt. 160 m. (NY); Hope River Cañon, *Harris 6943*, 200 m. (NY); Hope River course, *Harris 9037*, alt. 700 ft. (NY). Puerto Rico: Mayaguez Exp. Station, *N. L. & E. G. Britton 9844* (NY).

Although type material of *C. fulva* and *C. Berteriana* has not been seen, DeCandolle's description of *C. Berteriana* accords very well with the specimens examined and with Roxburgh's description of *C. fulva* published in 1832.[1] The compound racemose inflorescence, the silky-pubescent back of the standard, the ovate bracts and bractlets, and finally and, most strikingly, the very short pod enclosed within the

[1] The binomial appeared in Roxburgh's Hortus Bengalensis 54. 1814 as a *nomen nudum* but the description was not published until 1832; see C. B. Robinson in Philip. Journ. Sci. **7**: Bot. 411–417. 1912.

calyx, make this a most distinct species. Its affinities lie entirely with the Old World species, there being no American species which approaches this combination of characters.

3. C. VERRUCOSA L. Sp. Pl. 715. 1753; DC. Prod. **2**: 125. 1825; Grisebach, Fl. Brit. West Ind. 178. 1859; Duss, Fl. Phan. Antill. Fr. 192. 1897 (Ann. Inst. Colon. Marseille **3**: 192); Fawc. & Rend. Fl. Jam. **4**: 8. 1920; Urban, Symb. Antill. **5**: 278. 1920 (Fl. Domingensis), Symb. Antill. **9**: 447. 1928. *C. caerulea* Jacquin, Ic. Pl. Rar. **1**: t. 144. 1781–86. *C. angulosa* Lamarck, Encyc. **2**: 197. 1786. *C. flexuosa* Moench, Meth. Suppl. 55. 1802. *C. hastata* Steud. Nomencl. Bot. ed. 1, 239. 1821, in syn. *C. acuminata* G. Don, Gen. Syst. **2**: 134. 1832. *Anisanthera versicolor* Rafinesque, Fl. Tellur. **2**: 60. 1836. *Anisanthera hastata* Rafinesque, Fl. Tellur. **2**: 61. 1836. *Phaseolus Bulai* Blanco, Fl. Filip. 572. 1837, fide Merrill, Sp. Blanc. 177. 1918. *Quirosia anceps* Blanco, Fl. Filip. ed. 2, 398. 1845, ed. 3, **2**: 367. 1879, fide Merrill, loc. cit.—TYPE LOCALITY: "in India." DISTRIBUTION: widespread in the tropics; occurring locally throughout the West Indies, Central America and Florida as an introduced plant. BRITISH HONDURAS: Sibun River, Jones Lagoon, *Gentle 1480* (A, NY). BARBADOS ISLANDS: Waterford, St. Michael, *Bovell 352* (NY). GUADELOUPE: *Duss 2643*, low land (NY). MARTINIQUE: without locality, *Sieber I, 178*. TRINIDAD AND TOBAGO: Knagg's Hill Reservoir, *Williams 12060*.

3a. C. VERRUCOSA L. var. OBTUSA DC. Prod. **2**: 125. 1825.—FLORIDA: Miami, *Dahlberg s. n.*, March, 1938. BRITISH HONDURAS: Lower Belize River, *Record s. n.*, Feb. 1926. NICARAGUA: Managua. *Chaves 392* (US); vicinity of Managua, shore of Lake Managua, *Maxon, Harvey & Valentine 7295* (NY). PANAMA: Ahorea Lagarto to Culebra, *Cowell 363* (NY); Bohio Soldado, *Cowell 232* (NY). BAHAMA ISLANDS: Nassau, vacant lot off Shirley St. near Eastern Parade Ground, *Wight 100;* New Providence, *Cooper 80;* New Providence, Nassau, *Curtiss 29* (G, US); Nassau, *J. I. & A. R. Northrop 54*. BARBADOS ISLANDS: *Warming 60*, savanna (US); Hopewell, *Johnson 1247* (NY). CUBA: Havana, Vedado, *Leon 734* (NY); Oriente, Cabanas Bay, *Britton & Cowell 12710*, waste ground (NY). DOMINICAN REPUBLIC: without locality, *Wright, Parry & Brummel 82* (*Santo Domingo Comm. of Inquiry*) (G, US); Prov. Pacificados, Pimentel, *Abbott 697*, near sea level (US); Samaná Peninsula, vicinity of Sánchez, *Abbott 7*, sea level to 300 m. (US). GRENADA: St. George's, *Broadway s. n.*, Oct. 19, 1904, open places (G, US). GRENADINES: Becquia, *Joseph* (*for H. H. Smith*) *B. 263*, open land, 800 ft. to sea level. JAMAICA: vicinity of Kingston, *Clute 29*, alt. 500 ft. (G, US); between Kingston and Gregory Park, *Maxon & Killip 318*, along railroad, sea level (G, US); vicinity of Montego Bay, *Maxon & Killip 1655*, roadside and rocky banks (G, US); Constant Spring, *Churchill s. n.*, Mar. 21, 1897. MARTINIQUE: Corbet, *Duss 1112* (NY). MONTSERRAT: Coconut Hill, *Shafer 42* (NY, US). ST. BARTHOLOMEW: Gustavia,

Questel 79 (NY). St. Croix: Bassin Yard, *Ricksecker 72* (G, US); River Estate, *Thompson 380* (US); Frederiksted, *Rose, Fitch & Russell 3205* (NY). St. Martin: *Boldingh 3108 B* (NY). St. Thomas: without locality, *Eggers 67;* Canaan, *Eggers s. n.*, Dec. 22, 1875; without locality, *Curran 792.* Tobago: Scarboro, Breeze Hill, *Broadway 4261.* Virgin Islands: Tortola, Purcelles, *Fishlock 303.*

This is one of the best known species of the genus. It has been introduced into the West Indies and escaped from cultivation in many places to become a weed. Baker f., Journ. Linn. Soc. **42**: 254–255. 1914, reports it from Sierra Leone, Nigeria, French Equatorial Africa and Zanzibar. There is considerable variation in leaf-shape in the species. Most of the American material has the obtuse, occasionally retuse leaves of var. *obtusa* DC. rather than the ovate leaves of the type. In two of the specimens examined, *Maxon & Killip 1655* from Jamaica and *Record s. n.*, Feb. 1926, from British Honduras, there was a pronounced variation in leaf shape with a tendency toward the semi-hastate leaves of var. *acuminata* DC. Prod. **2**: 125. 1825. The blue flowers of this species and its broad and ovate foliaceous stipules make it very distinct.

4. C. spectabilis Roth, Nov. Pl. Sp. 341. 1821; DC. Prod. **2**: 125. 1825; Small, Fl. Se. U. S. 602. 1903; Larisey in Rhodora, **40**: 363. 1938. *C. sericea* Retz. Obs. Bot. **5**: 26. 1789 non Burman f. Fl. Ind. 156. t. 48. 1768; DC. Prod. **2**: 126. 1825; Grisebach, Fl. Brit. West Ind. 179. 1859; Fawc. & Rend. Fl. Jam. **4**: 9. 1920. *C. macrophylla* Weinmann in Syll. Ratisb. **2**: 26. 1828. *C. cuneifolia* Schrank in Syll. Ratisb. **2**: 78. 1828. ?*C. alatipes* Rafinesque, New Fl. N. Am. **2**: 57. 1836. *C. Leschenaultii* Macfadyen, Fl. Jam. **1**: 239. 1839, probably non DC. Prod. **2**: 125. 1825. *C. Retzii* A. S. Hitchcock in Rep. Missouri Bot. Gard. **4**: 74. 1893; Small, Man. Se. Fl. 679. 1933.—Type Locality: "India orientali." Distribution: India; and introduced throughout the Old World tropics and in scattered localities in the southern United States, the West Indies and Central America. Virginia: Newport News, outside the Mariner's Museum, *Ellyson & Puette 4596*, field; Sussex Co., Homeville, *Fernald & Long 7456*, dry field. Georgia: Warm Springs, *Howell s. n.*, Dec. 1933 (US). Florida: Little River, *Dahlberg s. n.*, Nov. 20, 1937; Key West, *Blodgett s. n.*, no date (NY). Texas: Gulf Coast, *Highway Dept. 10109* (F). Honduras: Dept. Atlántida, near Tela, Lancetilla Valley, *Standley 54042*, 20–600 m. (US). Cuba: near Matanzas, *Rugel 45* (NY); Santa Clara, Lomas de Banao, *Luna 733* (NY). Jamaica: *Hitchcock s. n.*, no date (F); *Waters s. n.*, no date.

Crotalaria sericea Burm. f. is clearly another Indian species, since it is described "bracteis linearibus setaceis," whereas the bracts in the

species under consideration are broadly ovate. Consequently *C. spectabilis* Roth is the first valid name. Macfadyen distinguished *C. Leschenaultii* from *C. retusa* only by the flowers and leaves of the former being larger than those of the latter. It seems probable that *C. Leschenaultii* is conspecific with *C. spectabilis* Roth. Fawcett and Rendle, Fl. Jam. **4**: 7–12. 1920 omitted *C. Leschenaultii* and Grisebach, Fl. Brit. West Ind. 179. 1859, included it under *C. sericea* Retz. The large ovate bracts of *C. spectabilis* Roth make it easy to distinguish from *C. retusa* L. in which the bracts are small and linear.

This species occurs very locally as an escape from cultivation in America. In the United States it has been used to a small extent as a green manure crop (McKee and Enlow, U. S. Dept. Agr. Circ. **137**: 25–26. 1931).

5. C. RETUSA L. Sp. Pl. 715. 1753; Schlechtendal in Linnaea **5**: 177. 1830; DC. Prod. **2**: 125. 1825; Grisebach, Fl. Brit. West Ind. 179. 1859; Duss, Fl. Phan. Antill. Fr. 193. 1897 (Ann. Inst. Colon. Marseille **3**: 193); Chapman, Fl. S. U. S. ed. 3, 96. 1897; Small, Fl. Se. U. S. 602. 1903; Urban, Symb. Antill. **4**: 281. 1905 (Fl. Portoricensis), Symb. Antill. **5**: 278. 1920 (Fl. Domingensis); Fawc. & Rend. Fl. Jam. **4**: 9. 1920; Britton in Addisonia **7**: 47. pl. 248. 1922; Small, Man. Se. Fl. 679. 1933. *Lupinus cochinchinensis* Loureiro, Fl. Cochinch. 429. 1790. *C. retusifolia* Stokes in Bot. Mat. Med. **3**: 516. 1812. *C. Hostmanni* Steudel in Flora **26**: 757. 1843.—TYPE LOCALITY: "in India." DISTRIBUTION: tropical Africa, India, Ceylon, China, Malay Peninsula, N. Australia, rarely in coastal south-eastern United States, Central America, commonly in the West Indies. NEW JERSEY: Hunterdon Co., Califon, *Fisher s. n.*, Sept. 21, 1902 (US). SOUTH CAROLINA: Santee Canal, old garden, no collector given. GEORGIA: Thomasville, *Mrs. A. P. Taylor 8771* (US). FLORIDA: Tallahassee, *Farlow s. n.*, Nov. 1891; Madison Co., 5 miles east of Madison, *Wiegand & Manning 1506*, sandy roadside; Marion Co., Ocala, *Shockley 1878;* Polk Co., Fort Meade, *J. D. Smith s. n.*, Apr. 4, 1880; St. Petersburg, *Mrs. C. C. Deam 2950*, bank of pond (NY, US); Tampa, *J. D. Smith s. n.*, Mar. 9, 1880 (US); Dade Co., near Silver Palm, *J. K. Small, Mosier & G. K. Small 6988*, pinelands (NY); Dade Co., Black Point, *Moldenke 400*, dry sandy soil along roadside (NY); Coconut Grove, *Young 40*, orchard (US); West Palm Beach, *Webber 63* (NY). LOUISIANA: Hamburg, *McAtee 2212* (NY, US). MISSISSIPPI: Mississippi City, *Phares 19* (US). TEXAS: Fort Worth, *Mrs. J. P. Stephenson 76* (US). MEXICO: Tamaulipas: Tampico, *Pringle 7674* (G, US); 8 km. east of Tampico, vicinity of La Barra, *E. Palmer 289*, 1910, sea level (G, US). Vera Cruz: Puerto de Alvarado, *Seler 4479* (G, US). BRITISH HONDURAS: Keys off coast, *Stevenson 159* (US); Belize River, Little Cocquericot, *Lundell 4368* (US); Sibun River, Craig Point,

Gentle 1406 (A, NY); New Town, *Schipp 816;* pine ridge near Manatee Lagoon, *Peck 128.* HONDURAS: Dept. Atlántida, vicinity of Tela, *Standley 56881, 53012,* sea level (US); near Puerto Sierra, along Yuro road, *Wilson 57,* potrero (NY, US); vicinity of Tela, *Mitchell 40,* sandy soil, under coconut palms on sea shore. NICARAGUA: Corinto, *Maxon, Harvey & Valentine 7208* (US); shore of Lake Managua, vicinity of Managua, *Maxon, Harvey & Valentine 7251* (US). COSTA RICA: near Puntarenas, Pitahayavieja, *West 3557,* bank of a tidal creek at edge of a mangrove swamp, alt. 5 m.; Boca Banana, Altantic shore, *Corduz 9150* (US); Limon, *Lehmann 1016,* dunes (US); Prov. Alajuela, vicinity of Capulin on the Rio Grande de Tárcoles, *Standley 40110,* alt. 80 m. (US). PANAMA: Canal Zone, vicinity of Fort Sherman, *Standley 31222* (US); Taboga Island, *Standley 27973* (US). BAHAMA ISLANDS: New Providence, Nassau, *Curtiss 25.* CUBA: Santa Clara Prov., Cienfuegos, Cieneguita, *Combs 25;* Santa Clara Prov., Soledad, near Harvard House, *Senn 12, 392,* potrero; Habana Prov., Santiago de las Vegas, near Wapay, *Baker & Wilson 338;* Santiago Prov., vicinity of San Luis, *Pollard & W. Palmer 299;* Cuba orientali, *Wright 117;* Isle of Pines, Vivijagua, *Jennings 108,* fields (NY). JAMAICA: St. Margaret's Bay, *Millspaugh 1937;* vicinity of Montego Bay, *Maxon & Killip 1650,* roadside; between Kingston and Gregory Park, *Maxon & Killip 319,* along the railroad, sea level; Constant Spring, *Churchill s. n.,* Mar. 21, 1897; without locality, *Wilson 282.* HAITI: Miragoane and vicinity, *Eyerdam 413;* Etang Saumatre, vicinity of Fond Parisien, *Leonard 4189,* borders of fields. DOMINICAN REPUBLIC: Santo Domingo, *von Türckheim 2598,* weedy places. PUERTO RICO: near Mayaguez, *Heller 4509,* along the beach, alt. 10 ft.; near Maricao, *Sintenis 3.* VIRGIN ISLANDS: Virgin Gorda, *Fishlock 182,* open places, fields, valley; Tortola, *Fishlock 30,* pastures, experiment station; St. Thomas, *Pease 22904;* St. Thomas, *Curran 790;* St. Thomas, *Eggers 222.* ANTIGUA: St. Johns, *Shafer 4* (NY). ST. MARTIN: *G. G. & B. W. Goodwin 10* (NY). GUADELOUPE: near la Basse-terre, *Duss 3018* (NY). MARTINIQUE: Saint-Pierre, *Duss 1110* (NY). ST. BARTHOLOMEW: St. Jean, *Questel 13* (NY). ST. LUCIA: *Walsh s. n.,* Sept. 1889 (NY). ST. KITTS: *Walsh s. n.,* Sept. 1889 (NY); Wingfield estate, *Britton & Cowell 597,* pastures (NY). ST. CROIX: Frederiksted, *Rose, Fitch & Russell 3202* (NY). ST. VINCENT: *H. H. & G. W. Smith 176,* fields and roadsides, 1000 ft. to near sea level. GRENADA: Belmont, *Broadway s. n.,* Dec. 1904, lowlands. TRINIDAD AND TOBAGO: Laventille, *Williams 12061.*

This is the most common and widespread of the Old World species which have been introduced into America. Throughout the West Indies it is found as a common weed of pastures and waste places. *Crotalaria retusa* somewhat resembles *C. spectabilis* Roth but may easily be differentiated from it by its ovate stipules and bracts, in

contrast to the minute setaceous stipules and linear bracts of the former. In some instances the stipules may be completely lacking in *C. retusa.*

6. C. NITENS HBK. N. Gen. Sp. Pl. **6**: 399. 1824. *C. nitidula* Mart. ex Schrank, Syll. Ratisb. **2**: 78. 1828. *C. bracteata* Schlechtendal & Chamisso in Linnaea **5**: 575. 1830, non Roxburgh, Hort. Beng. 54. 1814, Fl. Ind. ed. 3, 278. 1832. *C. Schiedeana* Steudel, Nomencl. ed. 2, **1**: 445. 1840.—TYPE LOCALITY: "Crescit prope Mariquita et Honda, alt. 160–400 hex. (Nova Granata)." DISTRIBUTION: Mexico, Guatemala, Honduras, Colombia, Peru, Bolivia and Paraguay. MEXICO: Vera Cruz: Hacienda de la Laguna, photograph (F, G) and fragment (F), of *Schiede 597*, type of *Crotalaria bracteata* Schlecht. & Cham.; *Linden 688;* Zacuapan, *Purpus 2329*, dry meadows (G, US); Zacuapan, *Purpus 8007* (G, US); Tlacatepec, El Fortin near San Martin, *Purpus 14217* (A, F), *16355* (G), rocks and rocky slopes; Zacuapan, *Purpus 10880*, rocky oak forests (US); near Jalapa, *Rose & Hough 4312* (US). Oaxaca: vicinity of Choapam, *Nelson 854*, 3800–4500 ft. GUATEMALA: Alta Verapaz, Coban, *von Türckheim II 1948*, 1350 m. (G, US); Alta Verapaz, Samac, *von Türckheim 104*, 4500 pp. (US); Dept. Huehuetenango, San Martin, *Seler 2766* (US), extreme form with acuminate leaves; Dept. of Quiche, Nebaj, *Skutch 1768*, 5700 ft. (A). HONDURAS: Dept. Comayagua, vicinity of Siguatepeque, *Standley 56370* (US).

The large conspicuous, persistent bracts and bracteoles make this a distinctive species. This character is especially conspicuous since peduncles bearing several flowerless bracts frequently occur. There is considerable variation in leaf-width within the species. The photograph of the co-type from the Berlin Herbarium (*Humboldt* in hb. Willd., Rio Magdalena) shows rather broad elliptic-cuneate to slightly obovate-cuneate leaves, whereas the photograph of the type of *C. bracteata* Schlecht. & Cham. (*Schiede 597*) shows much narrower oblong leaves. The cited collections, *Purpus 8007*, *16355* and *Linden 688*, approach the former in leaf-width although they are not obovate, whereas *von Türckheim II 1948* and *Purpus 2329* resemble *Schiede 597*. The dense pubescence of leaves and the stem and especially of the calyx, the margined or slightly recurved leaves, the large conspicuous bracts and the glabrous legumes support the conclusion that these represent one specific entity.

7. C. JUNCEA L. Sp. Pl. 714. 1753; DC. Prod. **2**: 125. 1825; Grisebach, Fl. Brit. West Ind. 179. 1859; Fawc. & Rend. Fl. Jam. **4**: 8. 1920. *C. benghalensis* Lamarck, Encyc. **2**: 196. 1786. *C. fenestrata* Sims in Bot. Mag. **44**: t. 1933. 1817. *C. porrecta* Wall. List, No. 5363. 1832, *nomen nudum*. *C. viminea* Wall. List, No. 5397 B. 1832, *nomen nudum*.

C. tenuifolia Roxb. Fl. Ind. ed. 2, **3**: 263. 1832. Type Locality: "in India." Distribution: Asia, introduced and escaped locally in the West Indies. Jamaica: Kings House Grounds, *Harris 6905* (NY), *11856* (G), sandy places, 400 ft. alt.; Half-Way Tree Road, *Harris 8274*, 300 ft. (NY). Dominican Republic: Hania, *Farrs 370*, roadside (US). St. Croix: Bassiv, *Ricksecker 211*, pasture (US). Martinique: St. Jean, *Duss 26* (NY); Parnasse, *Duss 1111* (NY).

This is the widely cultivated Sunn Hemp of India. The species occurs throughout the plains of India from the Himalayas to Ceylon and also in Malaysia and Australia. In the West Indies it has escaped from cultivation and become an annual shrubby weed.

8. C. tetragona Roxb. ex Andr. Bot. Rep. **9**: t. 593. 1809; Roxb. Fl. Ind. ed. 2, **3**: 263. 1832; Baker f. in Hooker f. Fl. Brit. Ind. **2**: 78. 1879; Fawc. & Rend. Fl. Jam. **4**: 9. 1920. *C. tetragonoloba* Roxb. ex Steudel, Nomencl. ed. 2, **1**: 445. 1840.—Type Locality: "Nepal." Distribution: India to Java. Jamaica: vicinity of Cinchona, roadside near Chestervale, *Britton 3* (NY).

Only one American specimen of this species was found in the herbaria examined. It is chiefly distinguished from its close congener *C. juncea* L. by its larger leaves and dark-brown pods.

9. C. pilosa Miller, Gard. Dict. ed. 8, No. 2. 1768, non *C. pilosa* Roxb. ex Mart. Denkschr. Acad. Muench. **6**: 156. 1820, non *C. pilosa* Thunb. Prod. Pl. Cap. 125. 1800, non *C. pilosa* Rafinesque, New Fl. N. Amer. **2**: 54. 1836. *C. pterocaula* Desvaux in Desv. Journ. Bot. **3**: 76. 1814; DC. Prod. **2**: 124. 1825; Grisebach, Fl. Brit. West Ind. 178. 1859 (excl. syn.). *C. genistella* HBK. Nov. Gen. Sp. Pl. **6**: 398. 1824; DC. Prod. **2**: 124. 1825; Bentham in Ann. Nat. Hist. **3**: 428. 1839.—Type Locality: "grows naturally at La Vera Cruz in New Spain." Distribution: South America and Mexico, Costa Rica, Panama, Cuba and Jamaica.

Crotalaria pilosa Miller and the succeeding seven species constitute a well defined American group characterized by small flowers and by the stipules (when present) more or less decurrent on the stem. To it Rafinesque, New Fl. N. Amer. **2**: 53. 1836, gave the subgeneric name *Iocaulon*. The specific lines within this group are somewhat indistinct and difficult to delimit. The present species, *C. pilosa* Mill. differs from the others of the group by the presence of definite equal regular wings on the upper part of the stem, the wings being continuous with the small triangular stipules.

Crotalaria pilosa Miller seems to be the earliest name available for this species. The photograph of the type specimen in the British Museum, kindly loaned by Mr. E. P. Killip of the United States

National Herbarium, clearly shows the winged stem characteristic of this species. While Miller's description does not indicate that the stems are winged the illustration and description of Martyn (Hist. Pl. Rar. 43. [t. 43.] 1728) to which he refers, obviously are based on the species under discussion, and Miller's specimen has winged stems.

The species contains three distinct but closely related varietal forms all characterized by the winged stem. The type specimen of *Crotalaria pilosa* is the broader-leaved form with leaves 1.2–2.0 cm. broad. In contrast the variety described below as var. *Skutchii* has leaves only 0.3–1.0 cm. broad. The pubescence cannot be clearly seen in the photograph of the type but is obviously much less conspicuous than that of variety *Skutchii* and much like that of *Lamb 568*.

KEY TO THE VARIETIES

Pubescence sparse, hirtellous; leaves lanceolate or elliptic.
Leaves lanceolate, 1.2–2.0 cm. broad; flowers small, vexillum about 1 cm. long ..... Var. *typica*.
Leaves elliptic, 2.0–4.0 cm. broad; flowers large, vexillum about 1.2–1.8 cm. long ..... Var. *robusta*.
Pubescence dense, sericeous; leaves linear to narrowly linear-lanceolate ..... Var. *Skutchii*.

Var. TYPICA. MEXICO: Vera Cruz: photograph of *Houston s. n.* (TYPE of *C. pilosa* Miller, in the herbarium of the British Museum) (US). Tepic: Zopelote, *Lamb 568* (G, NY, US).

9a. C. PILOSA Miller var. **robusta**, var. nov., a forma typica differt foliis latioribus (2.0–4.0 cm. latis) ellipticis; floribus majoribus (vexillum 1.2–1.8 cm. longum).—MEXICO: Mexico: dist. Temascaltepec, Cumbre de Tejupilco, *Hinton 2686*, in oak woods, alt. 2000 m. (TYPE in the United States National Herbarium).

This is a much larger and coarser plant, especially its leaves and flowers, than either the typical variety or var. *Skutchii*.

9b. C. PILOSA Miller var. **Skutchii**, var. nov., a varietate typica differt foliis angustioribus, linearibus vel lineari-lanceolatis, foliis caulibusque dense sericeis. COSTA RICA: Prov. San José, vicinity of El General, *Skutch 3071*, alt. 730 m. (TYPE in the Gray Herbarium); Cima Grande entre San Ramón y Atenas, *Brenes 11322*, 1175 m. (F); Acosta near San Tonacio, *Lankester 1174* (US). PANAMA: Canal Zone, Ancón Hill, *Standley 26357*, open grassy slope (G, US); Canal Zone, Red Tank to Pueblo Nuevo, chiva-chiva trail, *Piper 5143* (US); Canal Zone, Ancón Hill, *Killip 12075*, alt. 100–200 m. (US); Taboga Island, *Standley 28000* (US); Prov. Panama, near big swamp east of Rio Tecuman, *Standley 26581* (US); Prov. Panama, near Chepo, Sabana de Dormisolo, *Pittier 4654*, alt. 60–80 m. (NY). CUBA: without locality, *Wright 2203*; Oriente, Pinar de lá Caridad, southeast of

Yara, *Ekman 14682* (NY); Matanzas, Yacán Hill, San Miquel, Baños, *Leon & Roca 8837*, gravelly hilltop (NY); vicinity of Madruga, *E. G. & N. L. Britton & Shafer 734*, eruptive rock soil (NY); Pinar del Rio, near de las Vueltas, Rancho de Juan, Cajalbana, *Leon & Charles 4908* (NY); Isle of Pines, Nueva Gerona, *Curtiss s. n.*, Jan. 1904 (NY); Isle of Pines, vicinity of Jucaro, *N. L. & E. G. Britton & Wilson 14615*, pinelands. Jamaica: Upper Clarendon, James' Hill Savanna, *Harris 12844*, 2400 ft., near edge of swamp; without locality, *Hart s. n.* (F).

This variety, which is the most widespread form within the species, is distinguished from the type by its narrow linear leaves and their densely sericeous indumentum.

10. C. bupleurifolia Schlechtendal and Chamisso in Linnaea **5**: 575. 1830; Hooker, Ic. Pl. **4**: t. 372. 1841. *C. Heldiana* A. DC. in A. & A. P. DC. Mém. Soc. Phys. Hist. Nat. Genève **9**: 97 (23). 1841.—Type Locality: Hacienda de la Laguna, Mexico. Distribution: Mexico. Mexico: Sinaloa: San Ignacio, *Montes & Salazar 101*, alt. 1380 m. (US); San Ignacio, *Ortega 459*, 1380 m., Quebrada chica (A). Guerrero: Sierra Madre, *Langlassé 792*, 1750 m. (G, US); Chiconquiaco, *Schiede 596* (G, NY), cited by Schlechtendal, Linnaea **12**: 279. 1838. Oaxaca: Cerro Espino, *Reko 3621* (US). Vera Cruz: Zacuapan, Barranca de Tenampa, *Purpus 3663* (F, G, NY, US); Orizaba, *Mohr & Botteri s. n.*, July 1857, cultivated ground and pasture (US); *Botteri s. n.*, 1857 (US). Photograph of the type of *C. Heldiana* from seed from the garden at Carlsruhe, original source unknown, the type in the herbarium of the Geneva Botanic Garden.

This is rather a distinctive species, characterized by stipular bracts which subtend the flower-peduncles. No other stipules occur.

11. C. stipularia Desvaux in Desv. Journ. Bot. **3**: 76. 1814; DC. Prod. **2**: 124. 1825; Bentham in Ann. Nat. Hist. **3**: 428. 1839; Grisebach, Fl. Brit. West Ind. 178. 1859 (as *C. stipularis*); Duss, Fl. Phan. Antill. Fr. 192. 1897 (Ann. Inst. Colon. Marseille **3**: 192) (as *C. stipularis*); Urban, Symb. Antill. **4**: 280. 1905 (Fl. Portoricensis), Symb. Antill. **8**: 278. 1920 (Fl. Domingensis). *C. Espadilla* HBK. Nov. Gen. Sp. Pl. **6**: 399. 1824; DC. Prod. **2**: 124. 1825. *C. sagittalis* Vellozo, Fl. Flum. 308. 1825, Ic. Fl. Flum. **7**: t. 111. 1827. *C. sagittalis* Desv. ex Grisebach, Fl. Brit. West Ind. 178. 1859, in syn. *C. sagittalis* L. var. *Espadilla* O. Ktze. Rev. Gen. Plant. **1**: 175. 1891.—Type Locality: "in Cajenna." Distribution: Northern South America, Haiti, Dominican Republic, Puerto Rico, Guadeloupe, Dominica, Martinique, St. Vincent and Trinidad.

Although the type of this species was not available, four specimens from the vicinity of Cayenne, French Guiana (the type locality), were examined: *Broadway 333*, savannah; *Broadway 503*, sea shore; *Broad-*

way 564; Reservoir Hill, Matabon, *Broadway 794.* These specimens have the ovate-lanceolate leaves and large foliaceous stipules of Desvaux's description. The falcate incurved tips of the stipules and their decurrent bases which usually reach the complete length of the internode are most characteristic of this species, giving the appearance of a stem with successive triangular wings. The leaves of these Cayenne specimens vary in length from 1.5 to 3.0 cm. and in width from 0.6 to 1.3 cm. The stipular width at the node varies from 0.4 to 1.0 cm. These plants appear to be annuals with erect or ascending habit. The length of the internodes of the branches ranges from 1.1 to 4.0 cm. The leaves and stems are moderately sericeous.

There are two distinct forms in the region under discussion, which differ from the above interpretation of the type.

KEY TO THE VARIETIES

Internodes moderately long (1.1–4.0 cm.); leaves moderately large (1.5–3.0 x 0.6–1.3 cm.); stipules moderately broad at the node (0.4–1.0 cm.) ..... Var. *typica.*

Internodes short (0.6–1.0 cm., rarely longer); leaves small (0.6–2.4, mostly less than 1.5 cm. long, 0.4–0.6 cm. broad); stipules moderately large (0.4–0.9 cm. broad at the node) Var. *serpyllifolia.*

Internodes long (3.0–5.5 cm.); leaves large (2.5–6.5, mostly 4.0–6.0 cm. long, 0.8–3.0, mostly 1.1–2.0 cm. broad); stipules very large (0.8–1.4 cm. broad at the node) ..... Var. *grandifolia.*

Var. **typica**. HAITI: Dept. du Nord, vicinity of Marmelade, *Leonard 8255*, 800 m. (US); *Leonard 8222*, grassy summit of mountain, 800 m. (US). PUERTO RICO: Pueblo Viejo, *Stevenson 2571* (US); Juncos, *Stevenson 2988* (US). FRENCH GUIANA: Cayenne, *Broadway 333, 503, 564, 794,* type locality.

11a. C. STIPULARIA Desv. var. SERPYLLIFOLIA DC. Prod. 2: 124. 1825.—PUERTO RICO: along the railroad north of Mayaguez, *Heller 4574,* 15 ft. (G, US); Mayaguez, Monte Mesa, *Britton & Hess 2719* (NY); Santa Ana near Sabana Grande, *Britton & Cowell 4028A,* clay hillside (NY). TRINIDAD: south of Dabadie, Piarco Savanna, *Britton & Hazen 702.*

This variety occurs also in Brazil (Ceará, Fortaleza, Bairro de Beneficia, low waste ground near Lagon do Tanágre, *Drouet 2233, 2506,* sandy beaches).

11b. C. STIPULARIA Desv. var. **grandifolia**, var. nov., a varietate typica differt internodiis elongatis, 3.0–5.5 cm. longis, sparse pubescentibus; foliis magnis, 2.5–6.5 (saepissime 4.0–6.0) cm. longis, 0.8–3.0 (saepissime 1.1–2.0) cm. latis, fere elliptico-lanceolatis, sparse pubescentibus; stipulis magnis, basi 0.8–1.4 cm. latis, apice longe recurvis.—HAITI: Corail, *Nash & Taylor 1019,* mountain slopes (NY);

Plaisance, *Nash 639*, 2000 ft. (NY); Dept. Artibonite, sect. Dessalines, vicinity of Kalacroix, *Leonard 7859*, cultivated slopes, 700 m. (US); Massif du Nord, Le Borgne, Rose Marie Congo, *Ekman N. H. 4843*, 700 m. (US). Dominican Republic: Prov. de La Vega, near Garabawa at Rio Yaquir, *Fuertes 1669*, 550 m. (NY). Puerto Rico: near Mayaguez, in hills at Boquillas, *Sintenis 10* (G, US); near Mayaguez, *Holm 106*, dry fields; near Maricao, Indiera Fria, *Britton, Cowell & Brown 4475*, 430–800 m. (NY); Santa Ana near Sabana Grande, *Britton & Cowell 4028 B*, clay hillside (NY); Sabana Grande, B. Rincon, *Velez 841* (NY); Trujillo Alto, *Britton & Matz 7051* (NY); Rio Piedras, near Guarabo, *Stevenson 2988* (NY). Guadeloupe: Trois-Rivières, *Duss 2664*, 10–500 m. (NY); Basse-Terre to Gombegu, *Duss 3431* (NY, US). Dominica: Soufrieie, *Lloyd 432* (NY); Grand Savannah, *Lloyd 835* (NY). Martinique: River Salie, Zion-Vaillant, near St. Pierre, *Duss 1113* (NY, US); Fort Vaillant, *Hahn 239*, type, in the Gray Herbarium, isotype in the United States National Herbarium. St. Vincent: *H. H. & G. W. Smith 157*, open places and roadsides, 800 ft. to sea level; near Barrovollie, *H. H. & G. W. Smith 1053* (NY).

The variation in leaf-size on the individual plant suggested by Grisebach, Fl. Brit. West Ind. 178. 1859, in his varieties *oblongata* and *sericea* is not at all pronounced in most of the material studied, although there is a tendency toward this variation in *Leonard 8255* of var. *typica* and in *Britton, Cowell & Brown 4475* of var. *grandifolia*. This is a common South American species which has reached only the more southern West Indian islands. It is closely related to *C. sagittalis* L., *C. pilosa* Mill. and the South American *C. Pohliana* Benth.

12. C. **Tuerckheimii**, sp. nov. Herba versimiliter annua, *C. sagittali* affinis ad 33 cm. alta; caulibus teretibus vel subteretibus, simplicibus vel ramosis, ramis erectis, dense pilosis; foliis simplicibus anguste ovatis vel lanceolato-ovatis, basi rotundatis vel raro subcuneatis, 1.0–1.6 cm. latis, 2.5–4.2 cm. longis, sessilibus vel breviter petiolatis, utrinque pilosis; stipulis variabilibus, inferne nullis, superne late lanceolatis decurrentibus, circa 2 mm. latis; inflorescentiis lateralibus vel subterminalibus, 1–4-floris, 6–10 cm. longis, pedunculo pedicellisque fulvo-pilosis, bracteis solitariis, lineari-lanceolatis, circa 5 mm. longis, 0.5 mm. latis; bracteolis 2 ad basim calycis, lineari-lanceolatis eadem magnitudine bractearum; calyce dense fulvo-piloso, profunde lobato, lobis superioribus paullo latioribus, lanceolatis, circa 1 cm. longis, 2 mm. latis, inferioribus lanceolatis, circa 1.5 mm. latis; tubo brevi, circa 2.5 mm. longo; corolla ochroleuca calycem subaequante; legumine oblongo 2.5–3.0 cm. longo, 1.2–1.3 cm. lato, glabro, fulvo vel nigrescente.—Distribution: Mexico, Guatemala, El Salvador, Panama, Cuba. Mexico: Sonora: Rio Mayo, Sierra Chiribo canyon, *Gentry 1399*, old garden (F, G). San Luis Potosi: San Luis Potosi, 22° N. lat. *Parry & Palmer 127½*, alt. 6000–8000 ft. Durango:

La Bajada, Tamazula, *Ortega 4398* (US). Morelos: north of Cuernavaca, *Russell & Souviron 256* (US). Nayarit: Tepic, *Palmer 1867*, 1892 (F). Vera Cruz: Vallée de Cordova, *Bourgeau 1723;* Salto de Agua, *Purpus 1747*, dry open woods; Cordoba, *Orcutt 3147* (F). GUATEMALA: Alta Verapaz, Coban, *von Türckheim II 1282*, 1350 m., (TYPE in the Gray Herbarium, ISOTYPES in the Field Museum of Natural History and the United States National Herbarium); Alta Verapaz, Coban, *von Türckheim 239*, 4300 pp. (G, US); Alta Verapaz, vicinity of Secanquim, *Pittier 283*, alt. 550 m. (NY, US); Dept. Baja Verapaz, Sierra de las Minas, App. El Rancho, *Kellerman 8029*, 3500 ft. (F). EL SALVADOR: San Salvador, *Calderón 4.* PANAMA: Changuinola Valley, *Dunlap 117* (F); Prov. Panama, near Chepo, Sabana de Dormisolo, *Pittier 4686* (US). CUBA: without locality, *Wright 3528.*

12a. C. TUERCKHEIMII Senn var. **macrantha**, var. nov., a varietate typica differt foliis utrinque adpresse pilosis, floribus majoribus (circa 1.5–1.6 cm. longis).—MEXICO: Mexico: dist. Temascaltepec, Temascaltepec, *Hinton 5068*, oak woods, alt. 1750 m. (TYPE in the United States National Herbarium); Rincon, *Hinton 5624*, oak wood, 2140 m. (F); Rincon de Carmen, *Hinton 1730*, alt. 1340 m. (US). Sinaloa: *Ortega s. n.* (US). Jalisco: Sierra Madre Occidental, San Sebastian, *Mexia 1484-b*, arroyo seco, s. w., thicket near stream, 1500 m. (US).

This new species is very closely related to *Crotalaria sagittalis* L., from which it differs by the leaves which are rather uniformly ovate or ovate-lanceolate throughout the plant, by the narrow lanceolate bracts in contrast to the ovate-lanceolate, slender-stipitate bracts of *C. sagittalis* L., by the corolla approximately equalling the calyx, and by the usually annual habit of the plant. The collection from Sonora, *Gentry 1399*, varies from the type in that the pubsecence is white instead of fulvous. The new variety *macrantha* has distinctly larger flowers than the typical form, and its leaves have scattered adpressed-pilose pubescence in contrast to the abundant spreading hairs of the variety *typica.*

13. C. SAGITTALIS L. Sp. Pl. 714. 1753, except var. β; Lamarck, Encyc. **2**: 195. 1786, except var. β; Willd. Sp. Pl. **3**(2): 972. 1803, pro parte: Michaux, Fl. Bor. Am. **2**: 55. 1803, except var. γ *ovalis;* Pursh, Fl. Am. Sept. **2**: 469. 1814; Elliott, Sketch **2**: 193. 1822; DC. Prod. **2**: 124. 1825; Beck, Bot. 77. 1833; Darlington, Fl. Cestrica 404. 1837; Torr. & Gray, Fl. N. Amer. **1**: 370. 1840; Britt. & Brown, Ill. Fl. N. U. S. **2**: 268. fig. 2055. 1897; Chapman, Fl. S. U. S. ed. 3, 96. 1897; Small, Fl. Se.U. S. 602. 1903; Urban, Symb. Antill. **4**: 280. 1905 (Fl. Portoricensis); Robins. & Fern. in Gray's Man. ed. 7, 507. 1908; Fawc. & Rend. Fl. Jam. **4**: 10. 1920; Urban, Symb. Antill. **8**: 278. 1920 (Fl. Domingensis), Symb. Antill. **9**: 447. 1928; Small, Man. Se.

Fl. 679. 1933. *C. Sagittatas* Hill, Veget. Syst. **21**: 10. pl. 10. fig. 1. 1772. *Anonymos sagittalis* Walt. Fl. Carol. 181. 1788. *C. parviflora* Roth, Catalect. Bot. **1**: 83. 1797; Willd. Sp. Pl. **3**(2): 973. 1803; Poiret, Encyc. Suppl. **2**: 400. 1811; Pursh, Fl. Am. Sept. 469. 1816; Elliott, Sketch **2**: 193. 1822; DC. Prod. **2**: 124. 1825; Beck, Bot. 77. 1833. *C. platycarpa* Link, Enum. Hort. Berol. **2**: 227. 1822; DC. Prod. **2**: 124. 1825. *C. lunulata* Rafinesque, New Fl. N. Am. **2**: 55. 1836. *C. pilosa* Rafinesque, New Fl. N. Am. **2**: 54. 1836, non Miller, Gard. Dict. ed. 8, No. 2. 1768, non Roxb. ex Mart. in Denkschr. Acad. Muench. **6**: 156. 1820, non Thunb. Prod. Pl. Cap. 125. 1800.—Type Locality: "Brasilia, Virginia." Distribution: Eastern and Central United States, Central America, the northern West Indies and South America.

This is an extremely variable species with a wide range and a definite tendency to become a weed in freshly disturbed habitats. At the extreme northern limits of its range the species is usually annual in habit but from Virginia southward both annual and perennial forms are found. The varieties set forth below are extremes in a large series of variations. Many intermediate forms occur and it is frequently difficult to determine precisely in which category they belong.

Key to the Varieties

Leaf-shape variable throughout the plant; lower leaves elliptic, upper lanceolate or linear-lanceolate; plant herbaceous to suffruticose.
  Pods large (1.6–2.7 cm. long); plant erect, annual or perennial, 10 cm. or more high ..... Var. *typica*.
  Pods small (0.7–1.5 cm. long); plant erect or slightly decumbent, annual, short, usually less than 10 cm. high .... Var. *Blumeriana*.
Leaf-shape relatively constant throughout the plant; leaves linear; plant suffruticose ..... Var. *fruticosa*.

Var. typica. Vermont: Vernon, *Blanchard s. n.* 1901. Massachusetts: Neponset, *Faxon s. n.*; Concord, *Williams s. n.*, dry sandy bank, Sept. 21, 1902; Winchester, shore of Winter Pond, *Bartlett 224*; Cape Cod, Nine Mile Pond, *Greenman 406*; Hampden Co., Southwick, *Seymour 230*, sandy knoll; Deerfield, *Day 6*, dry open field; Amherst, *Stabler s. n.*, July 24, 1886; Hyde Park, near Hazelwood on east of railroad, *Kennedy s. n.*, Aug. 3, 1909. Rhode Island: without locality, *G. L. s. n.*, 1844. Connecticut: Southington, *Andrews 330*, sandy soils; Middlefield, *Kofoid s. n.*, Aug. 9, 1888; Franklin, *Woodward s. n.*, dry sandy soil, July 3, 1906; Plainville, *Wright s. n.*, July 11, 1888; Bridgeport, *Eames s. n.*, sandy wastes, Sept 5, 1898. New York: Long Island, Nassau Co., Port Washington, sandy beach of Manhasset Bay, *Hopkins 323*; Harlem, *Thurber s. n.*, 1859. New Jersey: Sussex Co., Springdale, *Svenson 6726*, dry fields; Mickleton, *Heritage* (*Halstead's Am. Weeds 122*); Ocean Co., Lakewood, *Hunnewell 6925*,

sandy soil; Tuckahoe, *Killip 308*, roadside (US). PENNSYLVANIA: Easton, Chestnut Hill, *Porter s. n.*, Aug. 23, 1889; Bucks Co., Bristol, *Benner s. n.*, dry soil in gravel pit, Aug. 4, 1927; Chester Co., *Sharples s. n.*, July 1858–64; Williamson, *Keller s. n.*, July 22, 1892; Delaware Co., Wayne, *Bartram 1162*, dry gravel bank; Lancaster Co., mouth of the Tucquan, *Small s. n.*, Aug. 7, 1890 (US). MARYLAND: Anne Arundel Co., Pumphrey's Station, *Plitt 681;* Baltimore Co., Bare Hills, *Tidestrom & Bartlett 5207* (US); Catonsville near Baltimore, *Foreman s. n.* (NY); east of Pataxent River near Chesapeake Bay R. R. *Shull 226* (US). VIRGINIA: Northampton Co., Eastville, *Fernald & Long 5321, 5322*, dry sandy pine woods; Northampton Co., south of Kendall Grove, *Fernald, Long & Fogg 5320, 5323*, dry clearing bordering pine woods; Elizabeth City Co., West of Hampton, *Fernald, Long & Fogg 4888*, bushy clearings and borders of woods; Sussex Co., north of Littelton, *Fernald & Long 6228*, dry argillaceous field; Prince George Co., north of Baxter Crossing, *Fernald & Long 6230*, alluvial woods of Second Swamp; Alexandria Co., *Hunnewell 5495*, sandy shore of river; 2 miles northwest of Williamsburg, *Grimes 3910*, dry sandy soil along C & O right of way; east of Lightfoot, *Grimes 4095*, along railroad; hillside near mouth of Hunting Creek, *Vasey & Coville s. n.*, July 22, 1888 (US); Pittsylvania Co., Fall Creek, *Heller 1107*, alt. 585 ft. (US); Fairfax Co., Potomac Bluffs, *W. Palmer s. n.*, Aug. 13, 1899 (US); Luray, *N. L. & Mrs. Britton s. n.*, Aug. 31, 1885 (NY); Norfolk Co., Portsmouth, *N. L. & E. G. Britton & Vail s. n.*, July 3, 1892 (NY). NORTH CAROLINA: Caldwell Co., 1 mile southeast of Hudson, *L. F. & F. R. Randolph 1096*, dry soil, waste field; Swain Co., *Beardslee & Kofoid s. n.*, dry hills, alt. 2500 ft., July 28, 1891; Polk Co., near Columbus, Huston Place, *Townsend s. n.*, July 14, 1897 (US); Buncombe Co., Biltmore, French Broad River, *Biltmore Herb. 1622[a]*, sandy soil (US). SOUTH CAROLINA: Cherokee Co., Blacksburg, *House 2524* (US); Lexington Co., vicinity of Batesburg, *McGregor 306* (US); Oconee Co., no collector given, *1318* (NY). GEORGIA: Whitfield Co., *Harper 399*, dry woods, alt. 900 ft. (NY, US); De Kalb Co., *Harper 192*, dry sandy field, alt. 975 ft. (US); Catoosa Co., Catoosa Springs, *Bilt. Herb. 1622[c]*, dry soil (US); De Kalb Co., between Stone Mt. and Tricum, *Small s. n.*, alt. 1000 ft., July 20, 1893 (NY, US); Cobb Co., near Chattahoochee River, *Harper 6*, alt. 790 ft. (NY). FLORIDA: Lake Co., vicinity of Eustis, *Nash 1259;* southern Florida, *Chapman s. n.* (US); Otter Creek, *O'Neill s. n.*, low pineland, July 30, 1929 (US); Polk Co., Peace Creek, *J. D. Smith s. n.*, Apr. 2, 1880. INDIANA: Spencer Co., 2½ miles south of Lincoln City, *Deam 41623*, gravelly bar in small creek; Marshall Co., Lake Maxinkuckee, *Clark s. n.*, railroad, 1809 (US). WEST VIRGINIA: Hardy Co., Lost River Bridge, *Core 3722;* Jefferson Co., Harper's Ferry, *Core s. n.*, flood plain, Aug. 20, 1931 (NY). KENTUCKY: Lyon Co., Iron Hill, *Eggleston 4813* (NY); without locality, *Short s. n.* (NY). TENNESSEE: Henderson, *Bain 58*, thin dry soil; near West Tenn. Teacher's College, *Moore 37* (US);

Lincoln Co. Elora, *Bilt. Herb. 1622b*, dry soil in oak barrens (US); Knoxville, *Ruth 301*, sandy situation (NY); Knoxville, *Ruth 2224*, banks and along railroad (NY). Alabama: Bladon Springs, *Mohr s. n.*, July 2, 1859 (US); Lee Co., Ridge Grove, *Earle 866* (NY); Lee Co., Auburn, *Earle & Baker s. n.*, July 12, 1897 (NY); Huntsville, *Underwood s. n.*, May 29, 1896 (NY). Mississippi: Oktibbeha Co., Agricultural College, *Pollard 1266* (G, US); Starkville, *Tracy 2009* (NY); Summit, *Holt 32* (US); Biloxi, *Tracy 4446* (NY, US); Newtonia, *Phares 1701* (US). Minnesota: Afton, Lake St. Croix, *Butters s. n.*, sandy strand, Sept. 16, 1919 (NY); Lindstrom, *Anderson s. n.*, July, 1894. Wisconsin: Sauk Co., Spring Green, *Davis s. n.*, on railroad, July 9, 1930; Bridgeport, *Denniston s. n.*, Aug. 5, 1914. Iowa: Muscatine Co., *Pammel & Reppert 1255;* Coralville, *Somes 3572* (US). Illinois: Pope Co., Thatcher's Gap, *Gleason 157;* Champaign Co., Urbana, *Pease 12488*, along the Wabash railroad; Madison Co., *Eggert s. n.*, sandy ground, June 27, 1878; Beardstown, *Geyer s. n.*, dry clay, July, 1842; Pinckney Hills, *Benke 4631* (US). Missouri: Iron Co., Shepherd Mountain, *Greenman 3864;* Morgan Co., vicinity of Buffalo Mill, in Helly woods, *Demetrio 110;* Sivett Co., *Eggert s. n.*, Aug. 31, 1894; Swope Park, *Bush 7693*, barrens. Arkansas: Camden, *Fendler s. n.*, June 10, 1850; 25 miles north of Hot Springs, *Scully 329*, low creek bank; Fort Smith, *Bigelow s. n.* (US); Benton Co., *Plank s. n.*, 1899 (NY); Drew Co., Monticello, *Demaree 13684*, 271 ft. (NY). Louisiana: Calcasieu Parish, Sulphur, *E. J. Palmer 7720*, dry open ground (US); near St. Martinsville, *Langlois s. n.*, Aug. 2, 1892 (US); St. Tammany Parish, 1 mile north of Abita Springs, *Pennell 4225*, dry pine land (NY); West Feliciana Parish, Catalpa, *Pennell 4302*, dry fields (NY); New Orleans, *Drummond s. n.*, 1832; without exact locality, *Torr. & Gray Fl. N. Am.* South Dakota: Clay Co., Vermilion, Missouri river, *Visher 5006*, flood plain (US). Nebraska: Otoe Co., *T. J. & M. F. L. Fitzpatrick s. n.*, dry soil, Aug. 10, 1898 (NY, US). Kansas: Clay Co., Oak Hill, *Panton s. n.*, 1896; Onaga, *Crevecoeur 2* (US); Laurence, *Stevens s. n.* (US); Riley Co., *Norton 80*, ravines (NY). Oklahoma: Choctaw Co., Grant, *Houghton 4023*, sandy lake bank; Comanche Co., Cache, *Stevens 1324*, by mountain rivulet (G, US); Ottawa Co., Hattenville, *Stevens 2488*, on bank of sludge pond. Texas: Dallas, *Reverchon s. n.*, May 1875; Hempstead, *Hall 157, 158*, prairies, banks (G, US); Grapeland, *Tharp 815* (US); Harrisburg, *Bilt. Herb. 1622f*, sandy soil (US); Dalby, *Milligan s. n.*, dry hills, May, 1897 (US); Houston, *Fisher 5017* (US); Brazos Co., Bryan, *E. J. Palmer 12723*, sandy prairies (NY); San Augustine Co., San Augustine, *E. J. Palmer 12700*, sandy open ground (NY); Walker Co., Huntsville, *Dixon 331* (NY). Mexico: Sonora: Rio Mayo, San Bernardo, *Gentry 1325*, arroyo bank, turf, unusual low small-leaved form. Colima: Colima, *E. Palmer 130*, 1897 (US). Jalisco: Guadalajara, *Furness s. n.*, 1909 (F); near Chiapala, *Rose & Painter 7636* (NY). Tepic: Sierra Madre, between Santa Gertrudis and Santa Terresa,

Rose 2119 (US). Durango: *Garcia 942* (US). Puebla: Malinas, *Russell & Souviron 247* (US). Morelos: near Cuernavaca, *Rose & Painter 6850.* Guerrero: along Cuernavaca-Taxco road, 10 miles from Taxco, *MacDaniels 123*, moist pasture, elev. 5500 ft. (F). Oaxaca: near Oaxaca, floodplain of Rio Atoyac, *Camp 2590* (NY), unusual low small-leaved form. Chiapas: between Huitztan and Orchuc, *Seler 2145*, mountain forest, gravel and limestone; near San Cristobal, *Nelson 3202*, 7000–8000 ft. (US). Vera Cruz: Orizaba, *Botteri 351 B* (F); Mt. Orizaba, Cordoba, *Seaton 437*, 2700 ft. (G, US); Vera Cruz: *Purpus 8383* (US); La Purga, *Greenman 276* (F); near Jalapa, *Rose & Hough 4305* (US). British Honduras: All Pines, *Schipp 548*, 5 ft. alt., unusual narrow-leaved form similar to var. *fruticosa* (Mill.) Faw. & Rend. but annual and not suffruticose. Guatemala: Zacatepéquez, Santiago, *Gómez 1020*, 6500 pp. (G, US); Alta Verapaz, Coban, *von Türckheim II 1282* (US); Dept. Escuintla, Texcuaco, *Morales R. 1062*, alt. 150 m. (F); Praderas cerca Guatemala, *Tonduz 654*, 1400 m. (US), somewhat decumbent form; Praderas de Guatemala, *Tonduz 708* (US). Honduras: Dept. Santa Bárbara, San Pedro Sula, *Thieme 5186*, alt. 1000 pp. (US), much variation in amount and type of pubescence in some specimens resembling *C. Purshii;* Dept. Copan, Cuesta Arrancabarba, Hac. Espirita Santa to Quebrada Majanales, *Blake 7455* (US). El Salvador: vicinity of San Salvador, *Standley 19576*, shaded bank, alt. 650–850 m. Costa Rica: El Rodio, *Stork 1020*, sandy soil, roadside, 4600 ft.; summits about Nicoya, *Tonduz 13544* (US); Prov. Cartago, Cartago, *Cooper 5747* (US); Prov. Cartago, Dulce Nombre, *Standley 35824*, alt. 1400 m. (US); San José, *Tonduz 443, 1418*, pastures, 1135 m. (US); San José, *W. W. & H. E. Rowlee 262* (NY); Prov. San José, Cerro de Piedra Blanca, above Escasú, *Standley 32570* (US); Prov. San José, vicinity of Santa Maria de Dota, *Standley 41765*, alt. 1500–1800 m. (US); Concaras, *Lankester 318*, pastures (F); *Lankester K291*, pastures (F); Cerros de San Rafael de San Ramón, *Brenes 5899* (F); Collines de San Pedro de San Ramon, *Brenes 4337, 4958*, pastures, alt. 1000–1025 m. (F); Cauetera Alajuela Grecia entre los rios Pilas y Tacares, *Brenes 17296* (F); Alto de Acosta de San Ramón, *Brenes 1667s* (F); San Juan cerca de San Ramón, *Brenes 16847* (F). Panama: Canal Zone, Corozal, *Standley 27404*, weedy field (US). Cuba: without locality, *Wright s. n.*, 1860–64. Jamaica: Castleton, *Harris 11855*, gravelly bed of river, 490 ft. alt.; vicinity of New Castle, *Britton & Hollick 1767*, roadside, (NY), somewhat suffruticose but the leaves variable in shape as in the variety *typica;* Cedar Hurst to Silver Hill Gap, *Britton 344*, roadside (NY); Moody's Gap, *Britton 3416* (NY).

13a. C. sagittalis L. var. **Blumeriana**, var. nov. Herba erecta vel subdecumbens, annua pumila plerumque minus quam 10 cm. alta; leguminibus parvis, 0.7–1.5 cm. longis.—Arizona: Chiricahua Mts.: Wilgus Ranch, *Blumer 1772*, top of ridge, rock and soil, rhyolite, alt. 6000 ft. (type in the Gray Herbarium, isotype at the Field Museum

of Natural History); *Blumer 138*, rhyolite ridge, alt. 6000 ft. (US); Patagonia Mts., *Kearney & Peebles 10164* (US); near Fort Huachuca, *Wilcox 362* (US); near Patagonia Mts., *Harrison & Kearney 6041*, sandy soil; Huachuca Mts., *Harrison & Kearney 5794* (US). Mexico: Sonora: between Buloco and Santa Cruz, *Thurber 1062* (F, G). Chihuahua: pine plains at base of Sierra Madre, *Pringle 1222;* hills near Cusihuiriachic, *Pringle 1507;* Sierra Madre, 5 miles S. E. of Colonia Garcia, *Townsend 307*, 7500 ft. (NY); Sierra Madre near Colonia Garcia, *Townsend & Barber 307*, 8000 ft. (NY); Sierra Madre Occidental, south of Colonia Garcia, *Pennell 19164*, stony pineland, alt. 2100–2200 m. (US); Sierra Madre Occidental, Madera, *Pennell 19228*, stony pineland, alt. 2150–2200 m. (US); Sierra Madre, continental divide, Mex. N. W. R. R., ridge between Rio Chico and Rio Caballo, *Barlow s. n.*, Sept. 30, 1911 (F). Mexico: Temascaltepec, Palmar, *Hinton 5185*, hill, 650 m. (US); Lodiego, *E. Palmer 1607*, 1891 (G, US); Alamos, *E. Palmer 712*, 1890.

13b. C. SAGITTALIS L. var. FRUTICOSA (Mill.) Fawc. & Rend. Fl. Jam. **4**: 10. 1920. *C. fruticosa* Miller, Gard. Dict. ed. 8, 1768. ? *C. scariosa* Rafinesque, New Fl. N. Amer. **2**: 56. 1836. *C. Pringlei* A. Gray in Proc. Amer. Acad. **17**: 200. 1881–82.—Florida: near Jacksonville, *Curtiss 4702 A*, dry pine barrens (US). Alabama: Lee Co., Auburn, *Earle & Underwood s. n.*, May 16, 1896 (NY). Mississippi: Oktibbeha Co., Agricultural College, *Pollard 1266* (NY). Texas: Dallas, *Reverchon 2656*, common in sand (NY). Arizona: Santa Catalina Mts., *Pringle 276* (type of *C. Pringlei* A. Gray). Mexico: Jalisco: near Etzatlan, *Rose & Painter 7571* (US), *Pringle 8855*, mountain-side; the last two specimens cited as well as *Pringle 11807*, Mexico, without exact locality, are characterized by an extremely dense tawny to gray pubescence and perhaps constitute a local form. Sinaloa: San Ignacio, Quebrada del Agua Friá, *Montes & Salazar 764*, alt. 400 m. (US). Mexico: Acuapanzingo, near Cuernavaca, *Woronow & Juzepczuk 916* (F); Huasteca, Wartenberg near Tantoyuca, *Ervendberg 30.* Vera Cruz: Camarón, *Purpus 11077*, fields (F); Zacuapan, *Purpus 14052 b*, plains (F). Without locality: *Sessé, Mociño, Castillo & Moldonado 3754* (F). British Honduras: Honey Camp, coastal region, *Lundell 665* (F, NY, US). Guatemala: Los Amates, ½ mile south, *Deam 124*, prairie, alt. 160 ft. (G, NY); Guatemala, *Tonduz 654a* (US); without exact locality, *Heyde 195* (US). Honduras: Dept. Comayagua, vicinity of Siguatepeque, *Standley 56237*, 1080–1400 m. (US). El Salvador: Ahuachapán, vicinity of Ahuachapán, *Standley 19747*, alt. 800–1000 m.; vicinity of San Salvador, *Standley 22444*, sand along river, alt. 650–850 m. Nicaragua: San Rafael de Norte, *Miller & Griscom 57*, pine woods, 1200–1350 m. (US). Cuba: Pinar del Rio Prov., Herradura, *Earle 762*, fields (NY); Pinar del Rio Prov., vicinity of Herradura, *N. L. & E. G. Britton, Earle & Gager 6404*, royal palm savanna (NY). Jamaica: Gordontown to Cinchona, banks near Salt Hill Pond, *Britton 31* (NY);

Devon Pen, *Thompson 7973*, 300 ft. (NY); Tweedside, South St. Andrew, *Harris 6923* (G, NY, US), cited by Fawcett and Rendle as variety *typica* but the woody terete lower stems and the absence of stipules indicate that this specimen should be considered a small plant of variety *fruticosa;* St. Andrew, road to Salt Hill, *Harris 11965*, 3800 ft. alt. (G, US); Castleton, *Harris 11855*, 490 ft. (US). HAITI: Dept. du Nord, vicinity of St. Michel de l'Atalaye, l'Atalaye plantation, *Leonard 7451*, alt. 350 m. (NY, US); Massif de la Pelle, Petionville, Nouvelle-Touraine, Chap. Faure, *Ekman N. H. 1501*, 1400 m. (US); Massif du Nord, Carice, Lamielle, *Ekman N. H. 6191*, pinelands 450 m. (US). PUERTO RICO: Bayaman, *Sintenis 1093*, shore. ST. KITTS: near Sandy Point, *Britton & Cowell 128*, pastures (NY).

14. C. ANGULATA Miller, Gard. Dict. ed. 8, No. 9. 1768. *Anonymos rotundifolia* Walter, Fl. Carol. 181. 1788. *C. sagittalis* L. var. γ *ovalis* Michaux, Fl. Bor. Am. **2**: 55. 1803. *C. rotundifolia* Poiret, Encyc. Suppl. **2**: 402. 1811; Britt. & Brown, Ill. Fl. N. U. S. **2**: 268. fig. 2056. 1897; Small, Fl. Se. U. S. 602. 1903; Robins. & Fern. in Gray's Man. ed. 7, 507. 1908; Small, Man. Se. Fl. 679. 1933. *C. ovalis* Pursh, Fl. Am. Sept. 469. 1814; Elliott, Sketch **2**: 193. 1822; DC. Prod. **2**: 124. 1825; Hooker in Bot. Mag. **57**: t. 3006. 1830; Torr. & Gray, Fl. N. Am. **1**: 370. 1840; Chapman, Fl. S. U. S. ed. 3, 96. 1897. *C. procumbens* DC. Prod. **2**: 129. 1825, non Roxb. Fl. Ind. ed. 2, **3**: 278. 1832, non Wall. List. No. 5437. 1832. *C. ovalis* Rafinesque, New Fl. N. Am. **2**: 56. 1836. *C. pumila* Rafinesque, New Fl. N. Am. **2**: 56. 1836, non Ortega in Hort. Bot. Matrit. Dec. **2**: 23. 1797, non Blanco, Fl. Filip. ed. 2, 397. 1845, non Hochst. et Steudel ex Baker in Oliver, Fl. Trop. Afr. **2**: 17. 1871. ? *C. asarifolia* Rafinesque, New Fl. N. Am. **2**: 57. 1836. *C. Hookeriana* A. DC. in A. P. & Alph. DC. Mém. Soc. Phys. Hist. Nat. Genève **9**: 97. 1841. *C. leptoclona* Schauer in Linnaea **20**: 737. 1847.—TYPE LOCALITY: "sent me from Campeachy where the plant grows naturally" (Campeche, Mexico). DISTRIBUTION: Southeastern United States, Mexico, and Guatemala. VIRGINIA: Isle of Wight Co., near Walters, *Fernald & Long 6229*, dry sandy yellow pine and oak woods (G, US); Isle of Wight Co., south of Zuni, *Fernald & Long 6610*, open spots in sandy pine and oak woods; Nansemond Co., Suffolk, *Heller 936* (G, US). NORTH CAROLINA: Craven Co., 2 miles south of James City, *L. F. & F. R. Randolph 534*, dry sandy soil, open pine woods; Onslow Co., Dixon, *L. F. & F. R. Randolph 961*, dry sand; Onslow Co., Lake Catherine, *House 4536*, pine lands (US); Southern Pines, *Blankinship s. n.*, July 20, 1895; Brunswick Co., 3 miles west of Wilmington, *Wiegand & Manning 1507*, sandy dry pine woods; Wilmington, *Stevens 6* (US). SOUTH CAROLINA: Horry Co., Myrtle Beach, *Weatherby & Griscom 16556*, roadway, dry sandy pine barrens, golf club (G, US); Charleston, *Robinson 144*, sandy openings of pine woods near Navy Yard; Charleston Harbour, Mt. Pleasant, *J. D. Smith s. n.* Apr. 17, 1880 (US); Charleston Co., 14 miles south of Charleston near Clementia Tourist

Camp, *Moldenke 1202*, dry sandy fields (US); Charleston, *W. Palmer s. n.*, June 2–10, 1902 (US); Charleston Co., Christ Church Parish, Porchers Bluff, *Mearns 61* (US); Columbia, *Canby 18a;* St Andrews, *Hexamer & Maier s. n.*, field, May 19, 1855; Beaufort Co., Bluffton, *Bilt. Herb. 2108g*, sandy soil (US); vicinity of Florence, *J. D. Smith s. n.*, Aug. 2, 1884 (US); Colleton Co., w. of Fenwick, *Hotchkiss & Eknall 3879* (US). Georgia: near Augusta, *Bilt. Herb. 2108i*, sand hills (US); Sparta, *Bilt. Herb. 1622e*, dry soil (US). Florida: Apalachicola, *Bilt. Herb. 2108a*, dry pine barrens (US); Leon Co., near Tallahassee, *E. J. Palmer 35224*, moist sandy ground along creek; Leon Co., Tallahassee, *Nash 2325* (G, US); Alachua Co., near Alachua, *Wiegand & Manning 1511*, sandy oak woods; South Jacksonville, St. John's River, *Torrey s. n.* March, 1872; Jacksonville, *Curtiss 5662*, in part, dry or damp pine barren (US); Duval Co., *Churchill s. n.*, Apr. 8, 1897; Duval Co., *Fredholm 5135*, pine barrens (US); Dunnellon, *L. F. & R. Ward s. n.* Feb. 25, 1891; Gainesville, *Bottimer 481a* (US), unusually long-petioled form; Gainesville, *Miller 392* (US); Orange Co., Clarcona, *Pieters 408* (US); Hillsboro Co., *J. D. Smith s. n.* Apr. 5, 1880 (US); between Cutler and Longview Camp, *Small & Carter 861*, pinelands near homestead road (NY); Cedar Keys, *J. D. Smith s. n.*, Mar. 7, 1880 (US). Alabama: Antanga Co., Hugger's Reservation, *Caperius s. n.*, borders of woods; Henry Co., 8 miles north of Abbeville, *Wiegand & Manning 1513;* Mobile, collector not given, May 9, 1839; Spring Hill, *Mackenzie 4027*, dry pine woods; Spring Hill, *Bush 47*, woods (NY, US); Mobile Co., Springhill, *Mohr 246*, dry sandy pine hills (US); Tallapoosa Co., *Earle s. n.*, Aug. 30, 1897 (NY); Lee Co., Auburn, *Earle & Baker 827* (NY); Auburn, *Lloyd & Earle s. n.* Sept. 1900 (NY); Chilton Co., Verbena, *E. A. Smith s. n.*, Aug. 22, 1874 (US). Mississippi: Ocean Springs, *Tracy 4447* (G, US); Long Beach, *Joor s. n.* wooded sand hill, July 21, 1891 (NY); Harrison Co., Biloxi, *Pollard 1052* (G, US); Harrison Co., Biloxi, west of bay, *Pennell 4385*, dry sandy pine land (NY); Beauvoir, *Tracy 4443, 4449, 4450* (US); Meridian, *Bilt. Herb. 2108h*, hillsides (US). Louisiana: New Orleans, *Drummond 77:* without exact locality, *Torrey s. n.* (Torr. & Gray, Fl. N. Amer.); St. Tammany Parish, 1–2 miles north of Abita Sorings, *Pennell 4257*, open pine land (NY). Mexico: Sinaloa: San Ignacio, Rancho del Agua Fria, *Montes & Salazar 693*, alt. 310 m. (US). Jalisco: near Guadalajara, *Safford 1397* (US); Sierra Madre, San Sebastian, Trail to Las Mesitas, *Mexia 1863*, 1700 m. (F, US); near Guadalajara, *Rose & Painter 7329* (US); vicinity of Jalisco, *Ferris 5834*, exposed roadside bank (US). Nayarit: east of Tepic, Cerro de la Cruz, *Mexia 663*, open thicket, 1000 m. (US); Tepic, *E. Palmer 2015*, 1892 (US); Tepic, *Jones 23036* (F). Federal Dist.: Santa Fé, *Pringle 9624* (US); Pedregal de San Angel, *Lyonnet 109* (NY, US); Xochimulco, *Orcutt 4353* (F). Mexico: dist. Temascaltepec, Comunidad, *Hinton 2454*, pine forest, alt. 2750 m. (US); Valley of Mexico, Santa Fé, *Bourgeau 574* (G, US); near Tlalpam,

Rose & Hough 4531 (US). Michoacan: Morelia, *Arsène 6834* (US). Morelos: Alarcan, *Rose & Hay 5315* (US). Puebla: vicinity of Puebla, *Arsène 1414* (US); vicinity of Puebla, Santa Barbara (Alsereca), *Arsène 10010*, 215 m.; vicinity of Puebla, between Santa Barbara and Cristo, *Arsène 10013*. Oaxaca: Sierra de San Felipe, *C. L. Smith, 328*, alt. 7000–8000 ft. (US); valley of Oaxaca, *Nelson 1481*, alt. 5500–7500 ft. (G, US). Vera Cruz: Orizaba, *Botteri 351 A* (F); *Müller 1587* (NY): Misatlanta, *Purpus 5907* (F, G, NY, US); near Jalapa, *Rose & Hay 6165* (US); near Jalapa, *Rose & Hough 4305* (US). Campeche: photograph of the TYPE of *C. angulata* Miller (British Museum). Salto de Agua, *Purpus 1747*, dry open woods (US); without exact locality, *Sessé, Mociño, Castillo & Moldonado 1909, 1922, 1926, 3703* (F). GUATEMALA: Dept. Zacatepequez, Santiago, *Gomez 1020*, 6500 pp. (US).

A photograph of the type of *Crotalaria angulata* Mill. from the herbarium of the British Museum clearly shows that this is the valid name for the species which has recently passed as *C. rotundifolia* (Walt.) Poir. Miller's description (Gard. Dict. ed. 8, No. 9. 1768) differs somewhat from his specimen, especially in the statement that "the flowers are produced singly from the side of the branches" whereas the photograph of Miller's specimen shows one peduncle which clearly bears two or perhaps three flowers. The description also states "this [*i. e.* the plant] rises with a taper upright stalk near three feet high, dividing upward in several hairy branches which grow erect." The entity which has been known as *C. rotundifolia* probably seldom exceeds a foot and a half in height and is a spreading plant with erect-ascending branches. The plant is described by Miller as annual while *C. rotundifolia* is probably always perennial. These discrepancies may in part be accounted for by Miller having based his description on plants grown in the greenhouse in England.

On the positive side the leaf-shape and size of Miller's type check very well with the Mexican specimens cited above. This leaf-shape, associated with the spreading pubescence of the stems (which is clearly shown in the photograph and stated in Miller's description), is a distinctive combination of characters which make this a fairly well defined species. The leaf-apex of the Mexican material, including the type, tends to be slightly acuminate, while in the material from the United States the apex frequently is blunter and more nearly obtuse. But the distinctions are not sufficient to warrant varietal separation.

The procumbent habit, oval to orbicular leaves, shaggy pubescence and relatively many-flowered racemes make this a distinct species

within the complex American group of simple-leaved species. Much of the material from Central America which has been identified as this species is in reality *C. Tuerckheimii*. It is possible that the reports of the species from South America are also based on similar material. The specimens cited above indicate the presence of *C. angulata* throughout much of Mexico. The plate and Hooker's description appearing in Curtis' Botanical Magazine (**57**: t. 3006. 1830) were prepared from plants grown from Mexican seed. Similarly DeCandolle's *Crotalaria procumbens*, Prod. **2**: 129. 1825, was based on a drawing of Mociño made from a Mexican plant (Calq. Dess. Fl. Mex. Mociño et Sessé, t. 227. 1874). Hooker's plate (Bot. Mag. **57**: t. 3006. 1830) on which *C. Hookeriana* A. DC. was based shows an erect plant rather than a procumbent one. But the leaf-shape, and especially the peduncles with several flowers rather than about three indicate that the species is conspecific with *C. angulata* Mill. rather than *C. Tuerckheimii* Senn.

15. C. Purshii DC. Prod. **2**: 124. 1825; Torr. & Gray, Fl. N. Am. **1**: 370. 1840; Chapman, Fl. S. U. S. ed. 3, 96. 1897; Small, Fl. Se. U. S. 602. 1903; Robins. & Fern. in Gray's Man. ed. 7, 507. 1908; Small, Man. Se. Fl. 679. 1933. *C. sagittalis* L. var. β. L. Sp. Pl. 714. 1753; Lamarck, Encyc. **2**: 195. 1786; Willd. Sp. Pl. **3**(2): 973. 1803, in part. *C. laevigata* Pursh, Fl. Am. Sept. 469. 1814, non Lamarck, Encyc. **2**: 198. 1786. ? *C. longipes* Rafinesque, New Fl. N. Am. **2**: 54. 1836. *C. cuneifolia* Rafinesque, l. c. 55. *C. linearis* Rafinesque, l. c. 55.—Type Locality: "in pine-woods of Virginia and Carolina." Distribution: Southeastern United States, Mexico and Guatemala. Virginia: Nansemond Co., Suffolk, *Heller 1107;* Nansemond Co., Suffolk, *Blankinship s. n.*, July 13, 1895; Isle of Wight Co., 1 mile southeast of Zuni, *Fernald & Long 6233*, dry sandy pine and oak woods; Dinwiddie Co., near Carson, *Fernald, Long & Smart 5805*, border of dry sandy woods. North Carolina: Weldon, *Canby s. n.*, July 1, 1878; Pasquotank Co., 2 miles southeast of Elizabeth City, *Wiegand & Manning 1495*, sandy roadside; Beaufort Co., 8 miles north of Washington, *Wiegand & Manning 1496*, sandy roadside by woods; Bladen Co., *Bilt. Herb. 1317*, pine barrens (US); Bladen Co., Clarkton, *Bilt. Herb. 1317*^{b}, pine barrens (US); Chowan Co., Edenton, *Kearney 1905* (US); Cumberland Co., Fayetteville, *Bilt. Herb. 1317*^{e} (US). South Carolina: Florence Co., 2 miles north of Lake City, *Wiegand & Manning 1500*, mucky open sandy thicket; Jasper Co., 2 miles north of Coosawhatchie, *Wiegand & Manning 1501*, moist sandy thicket; Summerville, *Hexamer & Maier s. n.*, open pine woods, May 24, 1855; Hartsville, *Norton s. n.*, edge of sand hills, sandy slopes, open woods, July 8, 1920 (US); Aiken, *H. W. R. s. n.*, June, 1869 (US);

Oconee Co., Keowee, *House 2204* (US), approaching *C. maritima* Chapm. GEORGIA: McIntosh Co., ½ mile northeast of Townsend, *Wiegand & Manning 1504*, dry sandy pine barrens; Fort Pulaski, *Stewart s. n.;* Bullock Co., *Harper 857*, dry pine barrens, Eocene overlaid by Lafayette and Columbia (US); Habersham Co., between Tallulah Falls and Toccoa Falls, *Small s. n.*, alt. 1000–1700 ft., Aug. 8, 1893 (NY); Worth Co., vicinity of Poulan, *Pollard & Maxon 558* (US); without exact locality, *Mrs. Naylor s. n.* FLORIDA: Lee Co., Punta Rossa, *Hitchcock 62*, strand; Lee Co., Myers, *Hitchcock 64, 65*, moist grassy places; Lee Co., vicinity of Marco, *Standley 12712, 12772*, pine woods, (US); Orange Co., Lanford, *Pieters 314* (US); Orange Co., Clarcona, *Pieters 64* (US); near Jacksonville, *Curtiss 533* (G), *543* (US), *4219* (US), *4753* (G, US), dry pine barrens; Duval Co., South Jacksonville, San Pablo, *Churchill s. n.*, April 14, 1897; Duval Co., *Fredholm 5197*, pine barren (G, US); near Apalachicola, *Bilt. Herb. 1317c*, grassy pine barrens (G, US); Lake Co., Eustis, *Nash 26*, high pine land; Brevard Co., Okeechobee region, *Fredholm 5931*, dry pine barren; Hillsboro Co., Tarpon Springs near Tampa, *Churchill s. n.*, sand barrens, Mar. 23, 1923; Sarasota Bay, mouth of the Manatee River, *Rugel 183*, sandy places near sea shore; Dade Co., west of Fulford, *Moldenke 5659*, dry sandy soil along roadside (NY); John's Pass, *Tracy 7792* (G, US); without exact locality, *Chapman Herb. s. n.* (G, US). TENNESSEE: White Cliff Springs, *Scribner s. n.*, July 1890 (US). ALABAMA: Atmore, *Blanton 254*, in high pineland; Gateswood, *Tracy 8693* (G, US); Mobile, no collector given, May 6, 1839; Buckley, *Sartwell s. n.* (US); Springhill College, Caliohi, *Mohr s. n.*, July 23, 1892 (US); Mobile, *Mohr s. n.*, pine barrens, May 20, 1879 (US); near Spring Hill, *Graves 569 B* (US), extreme narrow-leaved form. MISSISSIPPI: Jackson Co., Ocean Springs, *Pollard 1072* (NY, US), extreme narrow-leaved form; Biloxi, Horn Island, *Tracy 1994, 2005* (NY); Biloxi, *Tracy & Lloyd 188* (US), extreme narrow-leaved form; Nehoutieabooffe, *Tracy 4440* (US), narrow-leaved form; Beauvoir, *Tracy 4441, 4442* (US); Koshtaw, *Tracy 4444* (US). LOUISIANA: New Orleans, *Drummond 75;* vicinity of Covington, *Ames 50* (US); vicinity of Covington, *Arsène 12342* (NY), *12344* (US); New Orleans, *Ingalls s. n.*, 1834 (NY). TEXAS: Trinity, *Tharp 808* (US); Tarrant Co., *Killiam 6986* (US); Prairies of the Rio Grande, *Meyer s. n.*, 1844 (NY); without exact locality, *Wright s. n.* MEXICO: Nayarit: Tepic, *E. Palmer 1869*, 1892 (NY, US). Jalisco: Sierra Madre Occidental, San Sebastian west to Mascata, *Mexia 1408*, pine woods on steep hillside, 1425 m. (US).

This species has distinctly appressed pubescence in contrast to the spreading pubescence of *C. sagittalis* L. which it closely resembles. In the northern part of the range there is considerable variation in leaf-shape on individual plants, the lower leaves being oblong-elliptic or even obovate with more or less obtuse apices, the upper being

linear-lanceolate. In contrast in material from Florida, Alabama and Mississippi most of the leaves are linear-lanceolate.

15a. C. Purshii DC. var. **polyphylla** (Riley) comb. nov. *C. polyphylla* Riley in Kew Bull. **1923**: 333. 1923. *C. quercetorum* Brandegee in Univ. Calif. Publ. Bot. **10**: 407. 1924.—Mexico: Sonora: Sierra Charuco, Pinal, *Gentry 1692*, open slopes, upper Sonoran (F, G). Chiapas: Hacienda Monserrate, *Purpus 9144* (F, G, NY, US, isotypes of *C. quercetorum* Brandegee). Vera Cruz: Tlacomitla, *Purpus 13016*, rocky plains (F, NY). Guatemala: Santa Rosa, Cerro Gordo, *Heyde & Lux 3731*, alt. 3500 pp. (G, US); Chimaltenango, Alameda, *Johnston 14* (F); Alta Verapaz, Coban, *von Türckheim II 2016*, 1600 m. (F, US).

This variety differs from the type of the species by the stipules being entirely absent or, when rarely present, minute, and by the short-petioled, mostly linear, leaves. The variety *polyphylla* is annual in contrast to *C. Purshii* var. *typica* which is usually perennial. No stipules are present on the collections of *Purpus 9144* and of *Heyde & Lux 3731* but the collection of *Gentry 1692* has minute setaceous decurrent stipules at a few of the uppermost nodes. The slight variation in development of stipules is similar to that found throughout this group of species. The type of *C. polyphylla* Riley has not been seen but the description checks very well with the material examined. *Gentry 1692* shows the lower stem where the leaves have fallen and illustrates the nodular condition which Riley considered to be especially characteristic of his species. Brandegee regarded *C. quercetorum* as closely related to *C. sagittalis* L. This is of course correct in such an intimately related group of species, but the closely appressed pubescence of the entity under consideration associates it with *C. Purshii* DC. more closely than with *C. sagittalis* L.

16. C. maritima Chapman, Fl. S. U. S. ed. 2, Suppl. 614. 1883; ed. 3, 96. 1897; Small, Fl. Se. U. S. 602. 1903; Small, Man. Se. Fl. 679. 1933. *C. rotundifolia* var. *brachytricha* Sprague & Riley in Kew Bull. **1923**: 334. 1923.—Type Locality: "sandy beach at Palm Cape, South Florida." Distribution: Southeastern United States, Mexico and Puerto Rico. Georgia: Isle of Hope near Savannah, *Bilt. Herb. 2108c* (US); Savannah, *Bilt. Herb. 2108d*, sandy soil (US). Florida: Jacksonville, *Curtiss 4702 B*, dry sandy pine barrens (A, US); near Jacksonville, *Curtiss 4218* (US); near Jacksonville, *Curtiss 532*, dry pine barrens (US); Duval Co., Jacksonville, *Faxon s. n.* April 8, 1885; Duval Co., *Fredholm 5135*, pine barren; Orange Co., Sanford, *Pieters s. n.*, Aug. 23, 1899 (US); Orange Co., *Fredholm 5444*, dry pine barren; Orange Co., Winter Park, *Canby s. n.*, in part, dry sand, Feb.

1889; Lee Co., vicinity of Fort Myers, *Standley 12537*, pine woods (US); Lee Co., Punta Rossa, *Hitchcock 62*, strand (G,US); Lee Co., Owanita, *Kellogg s. n.*, about Mar. 18, 1907; St. John Co., near St. Augustine, Anastasia Isl., *Rugel 185;* St. John Co., near St. Augustine, *Rugel 184*, pine woods; Osceola Co., Kipimmee, *Mearns s. n.*, May 7, 1901 (US); Kissimmee Prairie, *Mearns s. n.*, April 25, 1901 (US); Escambia Co., *Bilt. Herb. 2108e*, sandy soil (US); Palatka, *Garber s. n.*, Feb. 1876 (US); Hillsborough Co., *Fredholm 6290*, dry sandy soil; Volusia Co., Ormond, *Fuller s. n.*, Mar. 2, 24, 1904, pineland; Palm Beach Co., Port Sewall, *Hunnewell 7344* (in part), pine barrens; Manatee Co., Manatee, *Garber s. n.*, March, 1878 (G, US); Brevard Co., Okeechobee region, *Fredholm 6440*, dry pine barren; Lake Co., near Eustis, *Hunnewell 8682*, dry oak woods; Columbia Co., Lake City, *Straub 14;* Dade Co., pinelands about Addison Hammock, *J. K. & G. K. Small 6623* (NY); Sanibel Island, *Tracy 7789* (in part) (G, US); No Name Key, *Simpson 534* (in part), dry pine woods; Ybor, *L. F. & R. Ward s. n.*, Mar. 1, 1891 (US); without locality, *Chapman s. n.* (G, US); Pine Key, *Blodgett s. n.* (in part); Cape Sable, *Curtiss 182*, sandy field. ALABAMA: Horn Isl. *Baker 689* (NY). MISSISSIPPI: Biloxi, *Tracy 2003, 2004, 2007, 2008* (NY). LOUISIANA: Mississippi delta, Cat Island, *Lloyd & Tracy 182* (NY, US) *240* (NY). MEXICO: Nayarit: Tepic, Sierra Madre, *Rose 3450* (US); Sierra Madre, near Santa Terresa, *Rose 2174* (US). Chihuahua: Sierra Gazachi, 35 km. southeast of Minaca, Barranca Colorado, *Pennell 18962*, rocky mountain slope, 2300–2500 m. (US); Mesa de Basaseachio, *LeSueur 689* (F); Sierra Madre, Arroyo Aucho, *Pringle 1223*, pine flats (G, NY, US). Durango: Otinapa, *E. Palmer 398*, 1906 (NY, US); *Palmer 395* (F); *Garcia 384* (US); Sierra Madre Occidental El Salto (Aserraderos), *Pennell 18357*, rocky pineland, 2570–2800 m. (US). Oaxaca: vicinity of La Parada, *Nelson 1014*, alt. 7500–8500 ft. (US); Sierra de San Felipe, *C. L. Smith 328*, 7000–8000 ft. (NY). PUERTO RICO: vicinity of Dorado, *N. L. & E. G. Britton & M. S. Brown 6653*, white sand (F, NY, US).

This species is distinguished by its thick fleshy root, procumbent habit, appressed pubescence, and elliptic-ovate to linear leaves. It is related on the one hand to *Crotalaria angulata* Miller and on the other to *C. Purshii* DC. The form in which all the leaves on the plant tend to be linear, which has been known as *C. Linaria* Small, is reduced to varietal status.

16a. C. MARITIMA Chapman var. **Linaria** (Small) comb. nov. *C. Linaria* Small, Man. Se. Fl. 679. 1933.—FLORIDA: Eustis, *Bilt. Herb. 1317d*, sandy soil (US); Orange Co., Winter Park, *Canby s. n.* (in part), dry sand; Hillsborough Co., Dunedin, *Tracy 6884* (G, NY, US); Monroe Co., Big Pine Key, *Small & Mosier 6034*, hammocks (NY, TYPE of *C. Linaria* Small); Monroe Co., No Name Key, *Small*

7447, pinelands (NY); Monroe Co., Big Pine Key, *Small 8156*, pinelands (NY); Monroe Co., Big Pine Key, *Moldenke 818*, dry sandy pineland (US) (some specimens are intermediate between var. *Linaria* and var. *typica*); Tarpon Springs, *Beckwith 657* (US); Shell Island, *Tracy 7793* (NY, US); Eau Gallie, *Curtiss 6109*, grassy field (US); Merritts' Island, *Baldwin s. n.*, May, 1893 (NY); between Cocoanut Grove and Cutler, *Small & Wilson 1901*, pinelands (NY); Ft. Lauderdale to Miami, *J. K. Small, Carter & G. K. Small 3367*, pinelands (NY); Miami, *Britton s. n.* April 1, 1903 (NY); Seminole, *Tracy 7791* (NY); Sanibel Island, *Tracy 7789* (in part) (G, US); Pine Key, *Blodgett s. n.* (in part); Palm Beach Co., Port Sewall, *Hunnewell 7344* (in part), pine barrens.

Section Eucrotalaria Baker f.

17. C. **Urbaniana**, nom. nov. *C. anisophylla* Urban, Symb. Antill. **9**: 448. 1928, non Welw. ex Hiern, Cat. Welw. Afr. Pl. **1**: 195. 1896; Baker f. in Journ. Linn. Soc. **42**: 260. 1914.—Type Locality: Cuba, "Oriente, Bayamo, on edge of Rio Bayamo." Distribution: Known only from the type locality. Cuba: Oriente, Bayamo, on edge of Rio Bayamo, *Ekman 16197* (Botanical Museum, Stockholm), type of *C. anisophylla* Urban.

The specimen on which this species is based has a somewhat abnormal appearance as if it may have been injured at some time during its development. The characters by which it is distinguished (the variation in number of leaflets from one at the base of the plant to three at the top of the plant) are so unmistakable that it seems advisable to admit it as a valid species until such time as more material is available. In the three large herbaria examined and in the large loan of material from the Field Museum no sheets were found to match this specimen from eastern Cuba. As noted above Urban's specific epithet is preoccupied, necessitating a new name for the species.

18. C. quinquefolia L. Sp. Pl. 716. 1753; DC. Prod. **2**: 135. 1825; Fawc. & Rend. Fl. Jam. **4**: 12. 1920; Merrill, Enum. Philip. Pl. **2**: 273. 1923; Urban, Symb. Antill. **9**: 448. 1928. Type Locality: "India." Distribution: India, Malay Archipelago, Philippines to Australia; introduced in the West Indies. Cuba: Oriente, Sierra de Nipe, Woodfred, *Ekman III 10143* (NY). Barbados: St. Michael, near entrance to Bush Hall, *Bovell 58* (NY). Guadeloupe: Capesterre, savanna near the seashore, *Duss 4025* (F, NY). Martinique: vicinity of St. Pierre, *Duss 1108* (NY); near Saint-Pierre, *Duss s. n.*, 1882 (NY).

This is an Old World species, locally introduced in the West Indies and very easily distinguished by its 5-foliolate leaves and large flowers and pods.

19. C. LOTIFOLIA L. Sp. Pl. 715. 1753 (by error spelled *latifolia*); DC. Prod. **2**: 134. 1825; Grisebach, Fl. Brit. West Ind. 180. 1859; Duss, Fl. Phan. Antill. Fr. 193. 1897 (Ann. Inst. Colon. Marseille **3**: 193); Urban, Symb. Antill. **4**: 281. 1905 (Fl. Portoricensis), Symb. Antill. **8**: 279. 1920 (Fl. Domingensis); Fawc. & Rend. Fl. Jam. **4**: 11. 1920, non *Crotalaria lotifolia* Poeppig ex Steudel, Nomencl. ed. 2, **1**: 443. 1840, non *Crotalaria lotifolia sensu* Baker in Oliver, Fl. Trop. Afr. **2**: 42. 1871.—TYPE LOCALITY: "in Jamaica." DISTRIBUTION: West Indies and locally in Yucatan and Honduras. MEXICO: Yucatan: no locality, *Gaumer 24264* (F). HONDURAS: Swan Islands, *Nelson 44*, clearings (G, NY). CUBA: Camaguey, vicinity of Tiffin, *Shafer 2891* (NY); Santiago Prov., vicinity of Santiago City, *Pollard, E. & W. Palmer 268*, 1902; Santiago, "The Ovens," *Millspaugh 1119, 1125* (F); Santiago, *Havard 85* (NY); Oriente, vicinity of Santiago, Santiago Harbour, *Britton 1882*, hillsides (NY); vicinity of Santiago, *N. L. & E. G. Britton & Cowell 12915*, wooded hills (NY); Antilla, *N. L. & E. G. Britton & Cowell 12441*, woodlands (NY); near Santiago, *Ekman III 7761*, in shrubbery (NY); Cuba Orientali, *Wright 118;* Cuba Orientali, *Wright 1589*, shaded hillsides; Oriente, Valley of Rio Matamoros, south of Holguin, *Shafer 1345*. JAMAICA: without exact locality, *Purdie s. n.;* Great Goat Island, *Harris 12520;* Great Goat Island, southeastern side, *Harris 9323* (NY); Lower Clarendon, Inverness, *Harris 12723;* Santa Cruz Mts., Potsdam to Pedro Plain, *Britton 1204*, wooded hillside (NY). PUERTO RICO: eight miles west of Ponce, *Heller 6273*, low ground along the coast (A, G); near Guanica, Mt. Alba, *Sintenis 3581*, shrubbery; near Ciamo, *Sintenis 2989 b*, shrubbery at the river.

This and the following closely related species, *C. Purdiana* Senn, are American members of the subsection *Oliganthae* Baker f. They are distinguished from the other species of the Section *Eucrotalaria* by the basally attenuated pods and by the short axillary inflorescences. *Crotalaria lotifolia* is a shrubby species up to 2 metres in height, which occasionally assumes a somewhat scandent habit. In the region under consideration it is limited in distribution to the West Indian Islands with the exception of stations in Yucatan and Honduras.

There are two distinct entities within the species. The type has not been seen but the Jamaican material just cited matches fairly well Sloane's plate (Nat. Hist. Jam. **2**: 33, t. 176 f. 1. 2. 1725), which is cited by Linnaeus. Sloane describes the leaflets as three-quarters of an inch (1.8 cm.) long and half as broad. In the specimens cited the leaflets range from 1.5–5.4 (av. 2.5–3.5) cm. long and 0.7–2.1 (av. 1.0–1.6) cm. wide. They are usually elliptic-acuminate, and semi-cuneate at the base. The flowers in these specimens are large (1.3–1.7

cm. long). The second entity has smaller obovate-elliptic leaves usually with obtuse or retuse apices. The flowers are also somewhat smaller than those of the specimens cited above. This is a new variety.

19a. C. LOTIFOLIA L. var. **Eggersii**, var. nov., a varietate typica differt foliis minoribus, 2.0–4.0 (saepissime 3.2–3.7) cm. longis, foliolis 0.9–1.7 (saepissime 1.2–1.4) cm. longis, 0.5–0.7 cm. latis, obovatis, apice obtusis vel retusis; floribus minoribus, 1.1–1.3 cm. longis.—BAHAMA ISLANDS: New Providence, *Brace 419* (NY); Eleuthera, Rock Sound and vicinity, *Britton & Millspaugh 5569* (NY). CUBA: Camaguey, Cayo Romano, vicinity of Pueblo Romano, *Shafer 2478* (G, NY); Camaguey, Cayo Paloma, *Shafer 2572* (G, NY). PUERTO RICO: Vieques Island, Ensenada Honda to Puerto Medio, *Shafer 3016* (NY); Vieques Island, Cabaza to Ensenada Honda, *Shafer 2944*, ravine (NY); near Guayanilla, *N. L. & E. G. Britton 9342*, sea beach (NY). ST. THOMAS: St. Thomas, *Eggers 130* (TYPE in the Gray Herbarium); Water Island and St. Thomas, Banana Bay, *Eggers s. n.*, strand, Aug. 20, 1876. BRITISH VIRGIN ISLANDS: Anagada, *Fishlock 1*, roadsides and near abandoned cultivations; Virgin Gorda, North Sound, *Fishlock 23*, roadsides and banks (NY). ST. JAN: *Britton & Shafer 512*, rocky hillside (NY). ST. CROIX: Christiansted, hill near town, *Rose, Fitch & Russell 3620* (NY).

20. C. PURDIANA Senn in Journ. Bot. **76**: 298. 1938.—TYPE LOCALITY: Colombia, Santa Marta. DISTRIBUTION: Santa Marta, Colombia and Habana Province, Cuba. CUBA: Habana Prov., Batabano, *Ekman 12621*, in palm savannas behind the manglares (F). COLOMBIA: Santa Marta, Manocapa, *Purdie s. n.* Sept. 1844 (TYPE in the Gray Herbarium, ISOTYPE in the herbarium of the Royal Botanic Gardens, Kew).

This species is closely related to *C. lotifolia* L. but may be separated from it by the axillary racemes bearing 4–8 flowers rather than 1–3, as in *C. lotifolia*, and by the leaves being hirtellous on the upper surface, rather than glabrous as in *C. lotifolia* L.

21. C. INCANA L. Sp. Pl. 716. 1753; Jacquin, Obs. Bot. t. 82. 1771; Cavanilles, Ic. **4**: t. 322. 1797; Grisebach, Fl. Brit. West Ind. 180. 1859; Duss, Fl. Phan. Antill. Fr. 192. 1897 (Ann. Inst. Colon. Marseille **3**: 192); Chapman, Fl. S. U. S. ed. 3, 97. 1897; Small, Fl. Se. U. S. 602. 1903; Urban, Symb. Antill. **4**: 281. 1905 (Fl. Portoricensis), Symb. Antill. **8**: 279. 1920 (Fl. Domingensis); Fawc. & Rend. Fl. Jam. **4**: 11. 1920; Rock, Legum. Plants Hawaii 137. pl. 60. 1920; Small, Man. Se. Fl. 680. 1933. *C. purpurascens* Lamarck, Encyc. **2**: 200. 1786. *C. pubescens* Moench, Meth. 161. 1794. *C. hirta* Lagasca, Gen. Sp. Nov. 22. 1816, non Willd. Neue Schrift. Ges. Naturf. Fr. Berlin **4**: 217. 1803, non Roth, Nov. Pl. Sp. 339. 1821. *C. affinis* DC. Prod. **2**: 132. 1825. *C. cubensis* DC. Prod. **2**: 131. 1825. *C. setifera* DC. Prod. **2**: 131. 1825. *C. diffusa* Vellozo, Fl. Flum. 307. 1825, Ic. Fl. Flum. 7. t. 110. 1827.

C. herbacea Schweigger in Schrank, Syll. Ratisb. **2**: 77. 1828. *C. Schimperi* A. Richard, Tent. Fl. Abyss. **1**: 151. 1847. *C. montana* A. Richard, Tent. Fl. Abyss. **1**: 152. 1847. *C. eriocaula* Schauer in Linnaea **20**: 738. 1847. *Crotalaria radiata* Merrill in Phil. Journ. Sci. Bot. **5**: 63. 1910. *Chrysocalyx Schimperi* Hochst. in Schimp. Pl. Abyss. No. 394, fide A. Richard, Tent. Fl. Abyss. **1**: 151. 1847 and Baker f. in Journ. Linn. Soc. **42**: 357. 1914.—TYPE LOCALITY: "in Jamaica & Caribaeis." DISTRIBUTION: Tropical and warm temperate America, the Philippines, Hawaii, Java, India and Africa. FLORIDA: Lee Co., Punta Rossa, *Hitchcock 61*, waste places (G, US); Lee Co., vicinity of Fort Myers, *Standley 18972* (US); Hillsborough Co., *Fredholm 6408*, sandy field (G, US); Indian River, *Curtiss 530*, rich soil (G, US); Manatee Co., Palmetto, *Nash 2461* (G, US); Biscayne Bay, *Palmer 98;* Biscayne Bay, *E. Palmer s. n.* 1874 (NY); Terra Cieca Bay *Rugel 186*, sea shore; Cape Florida, *Curtiss 5476* (G, US); Caximbas Pass, *Chapman s. n.;* Miami, *Garber s. n.*, May, 1877 (G, US); Miami, *Tracy 9101* (G, US); Mondongo Island, *Tracy 7720* (G, US); southern Florida, *Chapman 802* (US); Sneeds' Island, *Tracy 6338* (US); Dade Co., Addison Hammock, *Small 7478* (NY); Monroe Co., Cape Sable (East Cape), *Small 8029*, sand dune (NY); Cutler, Deering Hammock, *Small 8529* (NY); Clearwater, *Huger s. n.*, Jan.–Feb. 1902 (NY); Miami, *Small & Carter 1195*, pinelands (NY). ALABAMA: Mobile, *Mohr s. n.*, ballast ground, Oct. 28, 1891 (US). TEXAS: Brazos Santiago, *Nealley 79* (US). MEXICO: Lower California: San José del Cabo, *Anthony 346*. Sonora: Rio Mayo, San Bernardo, *Gentry 1306;* vicinity of Alamos, *Rose, Standley & Russell 13023* (US). Chihuahua: near Batalopos, Hacienda San Miguel, *E. Palmer 109*. Sinaloa: Mazatlan, Isla Piedra, *Lamb 362;* San Ignacio Los Candeleros, *Montes & Salazar 761* (US). Nayarit: Acaponeta, *Lamb 527;* vicinity of Acaponeta, *Rose, Standley, & Russell 14262*. Jalisco: Bolaños, *Rose 2885* (G, US). Nuevo Leon: Monterey, Sierra Madre Mts., *C. H. & M. T. Mueller 490*. Guanajuato: Guajito, *Dugès 245 A;* Valley Irapuato, *Pringle 2182*. San Luis Potosi: San Luis Potosi to Tampico, *E. Palmer 1046;* dist. Tanoanhuitz, near Tampamolon, *Seler 228*. Morelos: vicinity of Cuernavaca, *J. G. & Mrs. Lemmon 10*. Vera Cruz: Huasteca, Wartenberg, near Tantoyuca, *Ervendberg 295;* Nogales, *Reddick 124*, alt. 4300 ft. (US); Sanborn, *Orcutt 3071* (US); isthmus of Tehuantepec, Coatzacoalcos, *C. L. Smith 1148;* Mt. Orizaba, Maltrata, *Seaton 379*, 5500 ft.; reg. Orizaba, *Bourgeau 3176;* Rancho Remudadero, *Purpus 14320*, rocky places (F); Zacuapan, *Purpus 8001;* Jalapa, *Pringle 8282*, 4000 ft. (G, US). Oaxaca: Huitzo, *L. C. Smith 214*, 5500 ft.; Valley of Oaxaca, *Nelson 1297*, alt. 5000–5300 ft. (US). Chiapas: between San Richardo and Ocozucuzntla, *Nelson 2968*, 2600–3300 ft. (G, US). Yucatan: *Gaumer 775;* Yucatan, Kancabonot, *G. F. Gaumer & Sons 23518 a* (US). Without exact locality: *Sessé, Mociño, Castillo & Moldonado 1910, 1919, 1925* (F). GUATEMALA: Newton, *Nelson 3556*, 3000–3500 ft. (G, US); Dep.

Santa Rosa, Chupadero, *Heyde & Lux 4159;* near Huehuetenango, *Nelson 3671*, roadside, 6500–8000 ft. (US). Honduras: Puerto Cortez, *Carleton 622* (G, US); Dept. Atlántida, near Tela, Lancetilla Valley, *Standley 54018*, 20–600 m. (US). El Salvador: San Salvador, road from San Martin to Laguna de Ilopango, *Standley 22479;* Sonsonate, vicinity of Santa Emilia, *Standley 22124*, about 135 m.; Santa Ana, vicinity of Santa Ana, *Standley 19711*, 655–800 m.; Ahuachapán, vicinity of Ahuachapán, *Standley 20247*, 800–1000 m.; San Salvador, *Calderón 62;* vicinity of San Salvador, *Standley 23592*, 650–850 m. Nicaragua: Managua, *Chaves 415* (US). Costa Rica: Cartago, *Cooper 5746;* Prov. Cartago, Cerro de La Carpintera, *Standley 34514*, 1500–1850 m. (US); vicinity of San José, *Standley 47333*, alt. 1130 m. (US). Panama: vicinity of Panama, *MacBride 2623* (US); Canal Zone, Balboa, *Standley 27010* (US). Bahama Islands: Nassau, *Wight 203*, vacant lot, dry lime, sandy soil. Cuba: Oriente, *Wright 119;* Santiago, vicinity of Baracoa, *Pollard, E. & W. Palmer 241*, 1902; Santiago, vicinity of Santiago City, *Pollard, E. & W. Palmer 276*, 1902; Santa Clara Prov., dist. Cienfuegos, Cieneguita, *Combs 122;* Santa Clara Prov., Cienfuegos, Soledad, near Harvard House, *Senn 114*, potrero. Puerto Rico: Cabo-Rajo, Miradero, *Sintenis 695*, pastures; without exact locality, *Underwood & Griggs 122;* Vieques Island, vicinity of Isabel Segunda, *Shafer 2462* (NY). Jamaica: without exact locality, *Grisebach 358;* Moneague, *E. G. Britton 2955* (NY); Mandeville and vicinity, *N. L. Britton 1019*, roadside (NY). Haiti: Mission, Fonds Varetter, *Leonard 3629*, 1000 m. and above. Dominican Republic: Barahona Prov., near Barahona, *Fuertes 508*, sea level. St. Thomas: without exact locality, *Eggers 81;* without exact locality *Eggers s. n.*, Jan. 30, 1876; near Charlotte Amalia, *Rose 3161* (NY). Virgin Islands: Tortola Experiment Station, *Fishlock 129*, copses. St. Croix: Bassin Yard, *Ricksecker 15* (NY). Margarita Islands: El Vallee, *Miller & Johnston 50.* Guadeloupe: *Duss 2666* (NY). Martinique: *Duss 1109* (NY). Grenada: *Broadway s. n.*, Jan. 1905, sandy soil near sea, ballast ground. St. Kitts: near Sandy Point, *Britton & Cowell 129*, cane field (NY). Trinidad: Knagg's Hill Reservoir, *Williams 12062;* road between San Juan and Port of Spain, *Johnston 1;* Carra Valley road, *Britton & Mendelson 1589*, roadside; San Juan to Port of Spain, *Johnston 75*, roadside. Aruba: *Boldingh 6223* (NY). Curaçao: Banks, Patrick, *Britton & Schafer 3062* (NY).

Crotalaria incana is widespread in the American tropics, apparently indigenous there and introduced into the Old World. The species is especially characterized by its very deeply lobed calyx, the tube being almost lacking. There has been considerable confusion concerning the identity of DeCandolle's *C. setifera* (Prod. **2**: 131. 1825), this name being incorrectly applied to many specimens of *C. mollicula*

HBK. *C. setifera* DC. was based upon a tracing of Mociño's drawing of a Mexican plant. This tracing (DeCandolle, Calques Dess. Fl. Mex. Moc. & Sessé, t. 226. 1874) by the deeply cut calyx, the characteristic spreading pubescence of petioles, stem and legume, and by the leaf-shape, clearly shows *C. setifera* DC. to be conspecific with *C. incana* L. *C. herbacea* Schweigg. is not distinct from *C. incana* L., since *C. herbacea* is described as having glabrous leaves except for the lower surface of the mid-vein, but "caule petiolisque pilosissimis" and this variation occasionally occurs within the limits of a single specimen. The amount of pubescence is somewhat variable but the legume is usually covered with long spreading hairs. In one specimen the completely glabrous extreme was found.

21a. C. INCANA L. var. **nicaraguensis** var. nov., a varietate typica differt caulibus petiolis calycibus leguminibusque glabris.—NICARAGUA: Lake Nicaragua, Island Ometépe, *C. L. Smith s. n.*, Jan. 1893, TYPE in the Gray Herbarium.

This variety, striking because of its glabrous legume, stem, petiole and calyx, is known only from the type locality.

22. C. ERIOCARPA Bentham, Bot. Voy. Sulph. 80. 1844. *C. viminalis* Rose in Contr. U. S. Nat. Herb. **8**: 47. pl. 6. 1903.—TYPE LOCALITY: "Tepic," Mexico. DISTRIBUTION: Mexico. MEXICO: Nayarit: Tepic, *Lay & Collie s. n.* (K), TYPE; San Blas, *W. G. Wright 1351;* Acaponeta, Tiger Mine, *Jones 23035* (F). Jalisco: Bolaños, *Rose 2926* (G, US); San Antonia, Lake Chapala, *Herb. Univ. Chicago s. n.*, Feb. 8, 1893 (F); *Diquet s. n.* (NY). Sinaloa: Mazatlan, Villa Union, El Roble, *Ortega 6562; Ortega 7041* (F); Mazatlan, Bellavista, *Ortega 6835*, 10 m. (F); Mazatlan, Ortega 6744, 10 m. (F); vicinity of Mazatlan, *Rose, Standley & Russell 13691* (G, US); Mazatlan and vicinity, *W. G. Wright 1272;* Mazatlan, Isla Piedra, *Lamb 367ª*, sandy soil (G, NY); foothills of Sierra Madre, near Colomas, *Rose 1764;* Mazatlan, *Ortega 5674* (NY). Durango: La Bajada, Tamazula, *Ortega 4394* (US), *Ortega 618* (A). Morelos: near Cuernavaca, *Rose & Hough 4341* (type of *Crotalaria viminalis* Rose, in U. S. National Herbarium); *Rose & Painter 6946; Pringle 6557*, lava beds, 5200 ft. (F, G); *Pringle 11408*, lava fields, 5000 ft.; *Pringle 5993;* Mexico City-Cuernavaca road, *MacDaniels 273*, field, 5500 ft. (F); Tepoztlan, *Fisher 35239*, 7500 ft. (F, NY). Mexico: dist. Temascaltepec, Chorrera, *Hinton 1290*, edge of river, 1230 m., shrub (NY), intermediate between var. *typica* and var. *gloriosa*. Guerrero: Limon Mt., *Rusby 356*, 5000 ft. (NY), intermediate between var. *typica* and var. *gloriosa*. Without exact locality: *Tate s. n.* (K), cited by Bentham; *Allaman s. n.* 1832 (F), photograph and fragment; *Sessé, Mociño, Castillo & Moldonado* 1921 (F).

The very long racemes of large flowers and later the tomentose legumes set this handsome species sharply apart from its congeners. Rose considered that his *C. viminalis* was distinct from *C. eriocarpa* Bentham but a comparison of the types of both species and of the specimens cited above has led to the conclusion that there is no constant set of characters by which they can be separated.

22a. C. ERIOCARPA Bentham var. **gloriosa** (Rose) comb. nov. *C. gloriosa* Rose in Contr. U. S. Nat. Herb. **12**: 273. 1909.—MEXICO: Guerrero: near Iguala, *J. N. Rose, Painter & J. S. Rose 9412* (TYPE of *C. gloriosa* Rose in the U. S. National Herbarium, ISOTYPE in the Herbarium of the New York Botanical Garden); Taxco, *Abbott 249*.

This variety differs in being densely pubescent on both surfaces of the leaves and on the outer sides of the standard, carina and alae of the corolla. The type of *C. gloriosa* has golden-yellow pubescence while that of the other specimen cited is white. The habit of the plant and size of the flower clearly indicate that this entity is conspecific with *C. eriocarpa* Benth. rather than *C. mollicula* HBK. This variety of the Mexican endemic *C. eriocarpa* Benth. has thus far been found only in the state of Guerrero.

23. C. MOLLICULA HBK., Nov. Gen. Sp. **6**: 403. 1824. *C. monticola* Brandegee in Univ. Calif. Publ. Bot. **10**: 406. 1924.—TYPE LOCALITY: "Crescit prope Guanaxuato Mexicanorum, alt. 1070 hex." DISTRIBUTION: Mexico and El Salvador. MEXICO: Chihuahua: Rio Bonita, *LeSueur 710* (F). Morelos: Parque Station, *Pringle 13796*, 7500 ft. (G, US); near Cuernavaca, *Pringle 9180*, mountains, 7500 ft. (G, US); El Parque, *Orcutt 3824* (F); Sierra de Tepoxlan, *Rose & Painter 7226* (US). Zacatecas: near Plateado, *Rose 2765* (NY). Puebla: Cerro de Gavilan, *Purpus 3872* (G, NY, US). Michoacan: Quinceo, vicinity of Morelia, *Arsène 5669*, 2800 m. (G, US); vicinity of Morelia, *Arsène 6653* (US); Cerro Azul, vicinity of Morelia, *Arsène 2696*, 2100 m.; Verarapan, *Pringle 13696* (US). Oaxaca: Jayucattan, *L. C. Smith 105*, 4200 ft.; Rancho de Calderon, *L. C. Smith 106*, 5500 ft.; Sierra de San Felipe, *Pringle 4819*, 6500–7500 ft. (G, US); S. Pedro Nolasco, *Galeotti 3445, 3446*, 7500 ft. (US), approaching var. *Schaffneri;* vicinity of La Parada, *Nelson 1000*, 7500-8500 ft. (G, US); Nopalera a Henitzo, Nochixtlan, *Conzatti 1867* (US); Tecomatlan, *Seler 1541* (US), form with extremely narrow leaflets. Chiapas: Hacienda Monserrate, *Purpus 9133* (isotypes of *Crotalaria monticola* Brandegee at the Field Museum, Gray Herbarium and National Herbarium). Without exact locality: *Sessé, Mociño, Castillo & Moldonado 1911* (F). EL SALVADOR: San Vicente, Volcan de San Vicente, *Standley 21548*, 1200–1500 m. (G, US).

This species is usually a low spreading suffrutescent plant but it

may occasionally be an annual. There is some variation in leaf shape, certain specimens having long, ovate-lanceolate, acuminate leaflets. This variation occurs in the typical variety as well as in var. *Schaffneri*, described below.

23a. C. MOLLICULA HBK. var. **Schaffneri**, var. nov., a varietate typica differt foliis supra glabris vel glabratis.—MEXICO: San Luis Potosi: sandy places about the city, *Schaffner 813* (TYPE in the Gray Herbarium); vicinity of San Luis Potosi City, *Parry & Palmer 128*, 6000–8000 ft., 1878 (G, US): Zacatecas, near Plateado, *Rose 2765* (G), *2783* (US). Tamaulipas: Sierra de San Carlos, vicinity of San José, near crest of range above Mesa de Tierra, *Bartlett 10266* (F); Sierra de San Carlos, vicinity of San José, above La Vegonia, *Bartlett 10051*, 3300 ft. (F). Nuevo Leon: Taray to Rio Santa Ana, Pablillo, southeast of Galeana, Sierra Madre Oriental, *Pennell 17154*, thin soil over shale, 1850–2000 m. (US); Sierra Madre Oriental, Taray to Santa Ana Canyon, about 15 m. s. w. of Galeana, *C. H. & M. T. Mueller 940*, shale in open oak wood (A); Sierra Madre Oriental, Puerto Blanco to Taray, 15 m. s. w. of Galeana, *C. H. & M. T. Mueller 1213*, dry oak wood (A). Nayarit: Tepic, near Santa Teresa, Sierra Madre, *Rose 2179* (NY, US). Jalisco: Chapala, "*S. & E.*" *20*, rocky open hillside, 5000 ft. (US). Puebla: vicinity of Puebla, Cerro de Santa Maria de Zacatepec, *Arsène 3513*, 2500 m. (NY, US). Without exact locality: *Coulter 618* (K); *Coulter s. n.* (G), probably a duplicate of the last specimen cited. GUATEMALA: Dept. Chimaltenango, plains near Tecpam, *Skutch 535*, 2100 m. (A, US), approaching var. *typica*.

Watson (Proc. Am. Acad. **17**: 338, 1882) referred *Schaffner 813* to *Crotalaria eriocarpa* Benth., a species with much larger flowers, larger racemes and a tall fruticose habit. The relations of this entity are clearly with *C. mollicula* HBK.

24. C. MUCRONATA Desvaux in Desv. Journ. Bot. **3**: 76. 1814. *C. striata* DC. Prod. **2**: 131. 1825; Schrank, Syll. Ratisb. **2**: 76. 1828; Hooker, Bot. Mag. **49**: t. 3200. 1832; Grisebach, Fl. Brit. West Ind. 180. 1859; Fawc. & Rend. Fl. Jam. **4**: 12. 1920; Small, Man. Se. Fl. 680. 1933; non *C. striata* Schumacher & Thonning, Beskr. Guin. Pl. **2**: 110. 1827; non *C. striata* A. Braun, Flora **24**: 280. 1841. *C. incana sensu* Ker in Bot. Reg. **5**: t. 377. 1819, non Linn. *C. Brownei* Bert. in DC. Prod. **2**: 130. 1825. *C. pisiformis* Guillemin, Perottet & Richard, Fl. Seneg. Tent. **1**: 162. 1830–33. *C. Hookeri* Arnott in Ann. Sci. Nat. Sér. **2**, 3: 248. 1835. *C. Zuccariniana* D. Dietr. Syn. Pl. **4**: 935. 1847. *C. tinctoria* Boiv. ex Baillon, Bull. Soc. Linn. Paris **1**: 443. 1885.—TYPE LOCALITY: "in Antillis." DISTRIBUTION: Locally introduced in Florida, Alabama, Mississippi, Mexico and the West Indies; occurring also in Brazil, the East Indies, Ceylon, Australia, Hawaii, and tropical Africa. FLORIDA: Alachua Co., 3 miles south of Gainesville, *Wiegand*

& Manning 1494 a, dry sandy open woods; Pensacola, *Curtiss s. n.* (*530 ?*), 1866, ballast ground (G, US); Lee Co., 9 miles south of Fort Myers, *Standley 57562*, weed in cultivated field (F); Lee Co., Bokeelia, *Moldenke 933*, dry sandy soil (NY, US); Lake Co., west Mt. Dora, *Moldenke 8247*, sandy woods (NY); Escambia Co., Escambia Bay, *Bilt. Herb. 9567*[a], sandy soil (US); Polk City, *O'Neill s. n.*, Aug. 2, 1929 (US); Haines City, *Jesuphf 199* (F); Broward Co., near Lantana, *Small, Britton & De Winkeler 9223*, pinelands (NY); Tampa, *Rolfs s. n.*, May 22, 1919 (NY); Brevard Co., Merritt's Island, *Moldenke 216*, dry sandy soil, roadside (NY); Dade Co., Buena Vista, *Moldenke 431*, dry sandy field (NY, US); Little River, *Dahlberg s. n.*, Nov. 20, 1937. Alabama: Baldwin Co., *Ramsey s. n.*, Nov. 1908; Mobile, *Mohr s. n.*, river bank near mouth, Aug. 7, 1893 (US); Mobile, *Mohr s. n.*, ballast ground, Oct. 4, 1888 (US). Mississippi: McNeill, *Piper s. n.*, Oct. 12, 1921 (NY, US). Mexico: Michoacan or Guerrero, El Cedral, *Langlassé 305*, 300 m. Vera Cruz: Huasteca, Wartenberg, near Tantoyuca, *Ervendberg 22*. Jamaica: St. Mary's Parish, Gray's Inn, *Orcutt 4314* (F, G); Portland, Blue Mountains, *Perkins 1258*, roadsides and waste places; without exact locality, *Grisebach s. n.;* Kingston, *Alexander 1850 (?)* (NY); near Kingston, *Hansen s. n.* (NY); below New Castle, *Britton & Hollick 1771* (NY). Puerto Rico: Rio Pedras, Finca near Bayamar, *Stevenson 2492* (NY); Puetelo Viejo, *N. L. & E. G. Britton 9101*, roadside (NY). St. Kitts: *Thompson 557* (NY). West Indies: in America calidiore in Antillis, no collector given (photograph of type of *Crotalaria mucronata* Desv. in the herbarium of the Muséum d'Histoire Naturelle, Paris).

Through the kindness of Prof. H. Humbert of the Muséum National d'Histoire Naturelle in Paris and Mr. J. F. Macbride of the Field Museum in Chicago I have had the opportunity of examining an excellent photograph of the type of this species. This photograph clearly shows the striate carina and elliptic to obovate leaves which are characteristic of the species which has recently passed as *C. striata* DC. Desvaux's description is somewhat inadequate but the photograph of the type leaves no question of the identity of the species. Fawcett and Rendle, l. c., have already suggested that *C. striata* DC. and *C. mucronata* Desv. may be synonymous.

This species has also been confused with *Crotalaria Saltiana* Andrews, Bot. Rep. **10**: t. 648. 1811. According to Baker f., Journ. Linn. Soc. **42**: 309. 1914, *C. Saltiana* Andr. belongs to an entirely different section of the genus, *Farctae* Benth., characterized by long silky hairs lining the inner surface of the legume. Andrews' plate of *C. Saltiana* does not show the legume but the corollas illustrated do not have the brownish markings which are the most distinctive

feature of *C. mucronata* Desv. The Herbarium of the New York Botanical Garden contains a letter from Sir Arthur Hill of the Royal Botanic Gardens at Kew, stating that Dr. John Hutchinson had examined the type of *C. Saltiana* Andr. and found it to be distinct from *C. striata* DC. (*C. mucronata* Desv.). The material from which *C. Saltiana* Andr. was originally described came from Abyssinia and, according to Baker f., loc. cit., the species is limited entirely to Africa. In contrast *C. mucronata* Desv. is a widespread tropical species. Evidently the *Crotalaria striata* Zucc. cited by Dietrich, Syn. Pl. **4**: 935. 1847, is an error for *C. striata* Schrank since the citation in Sylloge Ratisbonensis **2**: 76. 1828 is identical and no *C. striata* Zucc. seems to have been described elsewhere. If so *C. Zuccariniana* D. Dietr. falls in synonymy under *C. mucronata* Desv.

25. C. USARAMOENSIS Baker f. in Journ. Linn. Soc. **42**: 346. 1914.—TYPE LOCALITY: "German East Africa, Usaramo." DISTRIBUTION: Eastern Africa; locally escaped in Florida. FLORIDA: Dade Co., Rockdale, *Moldenke 562*, dry grassy field (NY, US).

This is evidently a very local escape from cultivation since the species has recently been introduced into Florida for use in agriculture (McKee and Enlow, U. S. Dept. Agr. Circ. **137**: 27. 1931). It also occurs as an introduced plant in Java and Sumatra.

26. C. LONGIROSTRATA Hooker and Arnott, Bot. Beech. Voy. **6**: 285. 1838; Bot. Mag. **119**: t. 7306. 1893; Rock, Legum. Plants Hawaii 135. pl. 59. 1920.—TYPE LOCALITY: "Talisco." DISTRIBUTION: Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica and introduced into Hawaii. MEXICO: Chihuahua: Rio Mayo, Guasaremos, *Gentry 2459*, grassy flats (A, F). Nayarit: Tepic, Zopelote, *Lamb 560*, 2000–3000 ft.; Mina Esperanza Rosa Morades, *Ortega 6656* (US). Jalisco: mountains near Lake Chapala, *Pringle 5975* (G,US); Sierra Madre, San Sebastian, Arroyo de Triangulo, *Mexia 1324*, streamside, 1425 m. (A, NY, US). Sinaloa: Culiacan, *Reko 4465*, 50 m. (US). Mexico: Temascaltepec, Cajones, *Hinton 8306* (US). Michoacan: waste fields about Lake Patzcuaro, *Pringle 4144* (F, NY); Patzcuaro Hills, *Pringle 3588;* Coru Station, *Pringle 11957*, 6000 ft. (G, US); vicinity of Morelia, second cascade towards Huerta, *Arsène 5313*, 1950 m. (US). Guerrero: Iguala Canyon, *Pringle 13514*, 2500 ft.; Acapulco and vicinity, *E. Palmer 525*, 1894–1895. Colima: Colima, *E. Palmer 1139*, 1891. Puebla: Cerro de Gavilan, *Purpus 3873*, 7000–8000 ft. Chiapas: near Huehuetan, *Nelson 3823*, 500–2000 ft.; Gutierrez, *Doyle 153* (US). Oaxaca: vicinity of Cafetal Concordia, *Morton & Makrinius 2683*, 400–650 m. (US). Vera Cruz: Papantla, *Seler 3678* (US). Without exact locality: *Sessé, Mociño, Castillo & Moldonado 4908* (F). GUATEMALA: Dept. Escuintla,

Escuintla, *J. D. Smith 2320*, 1100 ped.; Dept. Alta Verapaz, Coban, *von Türckheim II 1349* (G), *II 1949* (F), 1350 m.; Dept. Retalhulen, Retalhulen, *Kellerman 6353*, 237 m. (F); Peten, La Libertad and vicinity, *Mercedes Aguilar H. 32* (F); Chimaltenango, Lugar, Paujachel, *Johnston 788* (F); Santa Maria le Jesus, Sacatepequez, *Popenoe 950* (US); Mazatenango, *Bernoulli 545* (NY). El Salvador: Dept. La Libertad, vicinity of Ateos, *Standley 23416;* Dept. La Libertad, vicinity of Santa Tecla, *Standley 23050*, 790–950 m.; Dept. Sonsonate, vicinity of Izalco, *Standley 21856;* Dept. San Salvador, vicinity of San Salvador, *Standley 19277*, open slope, 650–850 m.; vicinity of San Salvador, *Standley 20585*, roadside, 650–850 m.; San Salvador, *Calderon 5;* Dept. San Vicente, vicinity of San Vicente, *Standley 21294*, in sand along river, 350–500 m. Nicaragua: Dept. Chinandega, Chinandega, *Baker 88*, local along woodland paths. Costa Rica: Cerro de Protti, Escasu, *Solis 308, 316* (F).

27. C. pumila Ortega, Hort. Bot. Matrit. Dec. **2**: 23. 1797; DC. Prod. **2**: 132. 1825; Grisebach, Fl. Brit. West Ind. 179. 1859; Chapman, Fl. S. U. S. ed. 3, 97. 1897; Small, Fl. Se. U. S. 603. 1903; Urban, Symb. Antill. **8**: 279. 1920 (Fl. Domingensis); Fawc. & Rend. Fl. Jam. **4**: 11. 1920; Small, Man. Se. Fl. 680. 1933; non Blanco, Fl. Filip. ed. 2, 397. 1845; non Hochst. et Steudel ex Baker in Oliver, Fl. Trop. Afr. **2**: 17. 1871. *C. litoralis* HBK. Nov. Gen. Sp. **6**: 401. 1824; DC. Prod. **2**: 134. 1825 (as *C. littoralis*). *C. lupulina* HBK. Nov. Gen. Sp. **6**: 402. pl. 590. 1824; DC. Prod. **2**: 133. 1825. *C. triantha* DC. Prod. **2**: 135. 1825; Calques Dess. Fl. Mex. Moc. et Sessé t. 225. 1874; non Steud. ex Baker in Oliver, Fl. Trop. Afr. **2**: 16. 1871. *C. dichotoma* Graham in Edin. New Philos. Journ. **1826**: 186. 1826; Hooker in Bot. Mag. **54**: t. 2714. 1827; Hooker & Arnott, Bot. Beech. Voy. 284. 1838; non Roth, Nov. Pl. Sp. 340. 1821. *C. Grahami* Sweet, Hort. Britt. ed. 2, 128. 1830. *C. Tepicana* Hooker & Arnott, Bot. Beech. Voy. 414. 1840; Walp. Rep. **1**: 594. 1842 (as *C. topicauca*). *C. elliptica* Martens & Galeotti, Bull. Acad. Roy. Bruxelles **10**(2): 34. 1843. *C. Galeotti* Bentham in Hook. Lond. Journ. Bot. **2**: 582. 1843. *C. puberula* Hooker f. in Trans. Linn. Soc. **20**: 225. 1847. *C. pendula* Bentham in Duss, Fl. Phan. Antill. Fr. 193. 1897 (Ann. Inst. Colon. Marseille **3**: 193). *C. chiapensis* Brandegee in Univ. Calif. Publ. Bot. **10**: 406. 1924.—Type Locality: "Insula Cuba." Distribution: Florida, southwestern United States, Mexico, Guatemala, British Honduras, the West Indies and South America. Florida: southern Florida, *Chapman s. n.* (US); Miami, *Tracy 9096;* Indian River, sand ridges between ocean and river, *Curtiss 533* (G, US); Biscayne Bay, *E. Palmer 100*, 1874; Miami, *Garber s. n.*, March, 1877 (G, US); Palm Beach, sand ridges next the ocean, *Curtiss 5361* (F, G); Palm Beach, *Hunnewell s. n.*, 3–7–1912; Dade Co., dry sand, *Fredholm 5654;* Dade Co., Burden's, pine woods, *Eaton 1237;* Miami, *Simpson s. n.*, Feb. 28, 1892; southern Florida, *Cooper s. n.*, 1859; Upper Hatecunbe, *Simpson s. n.*, Feb. 6, 1892 (G, US). Texas: vicinity of El Paso,

Stearns 202 (US); western Texas to El Paso, N. Mex. *Wright 143* (G, US). New Mexico: without exact locality, *Edwards s. n.*, 1849; Chiricahua Mts., *Wright 1018* (G, US); Chiricahua Agency, *Rothrock 534, 684* (US); Dog Mts., Dog Spring, *Mearns 2339* (US); Burro Mts.?, gravelly hills, *Rusby 73* (US). Utah: southern Utah, *Johnson s. n.*, 1875 (US), the correctness of this label has been questioned. Arizona: Fort Huachuca, *Ratzky 89* (US); cañon east side of the San Luis Mts., *Mearns 2188* (US); Tucson, *Griffiths 3363* (US); Fort Crittendon to Patagonia, *Griffiths 6114* (US); Camp Grant, Parade Ground, *Rothrock 727*, 5000 ft. (US); Santa Rita Mts., Gardiner's Spring, *Pringle s. n.*, June 25, 1882 (G, US); base of San Luis Mts., *Mearns 2154*, up to 6000 ft. (G, US); Apache Pass, *Lemmon 543, 544;* Bisbee, *Lloyd s. n.*, Oct. 4, 1890; El Frida, *Jones 192;* Chiricahua Mts., Paradise, *Blumer 1767*, creek sand, 5300 ft. (G, US); Huachuca Mts., Tanner Cañon, *Goodding 823*, open flats in the timber (G, US); near base of Santa Catalina Mts., *Peebles, Harrison & Kearney 2576* (US); Santa Catalina Mts., *Harrison 3012* (US); Bowie, *Jones s. n.*, 1884 (US); Nogales, *Peebles & Harrison 4683* (US); near Fort Huachuca, *Wilcox 444* (US); Empire Ranch, *Griffiths & Thornber 237* (US); Huachuca Mts., *Harrison & Kearney 5780* (US); near Elgin, *Peebles, Harrison & Kearney 3340* (US); Rincon Mts., *Neally 234*, 4500 ft. (US); Mexican boundary line near White Water, *Mearns 2292* (G, US); Chiricahua National Forest, Cochise Co., Portal to Paradise, Silver Creek, *Eggleston 10723* (US). Mexico: Baja California: San José del Cabo, *Brandegee 115* (US). Sonora: 10 miles north of San Rafael Ranch, *Shreve 6384* (F); Rio Mayo, Canyon Sapopa, edge of the milpas, *Gentry 1052* (F, G); Rio Mayo, San Bernardo, *Gentry XO* (F); road between Altar and Magdalena, *Schott III 39* (F); *Thurber 956;* between Santa Ana and Allar, *Piuy, Bigelow, Wright & Schott s. n.*, 1855. Chihuahua: between San Pedro and Fronteras, *Hartman 923;* without exact locality, *E. Palmer 26*, 1869; Santa Cruz, *Thurber 949, 956;* La Cruz de los Cañadas, *Lloyd 386, 387;* Chihuahua, Parral, *Goldman 120;* without exact locality, *Thurber 782;* near Batapilas, Hacienda San Miguel, *E. Palmer 146*, 1885; Rosario east of La Junta, *Le-Pennell 18757*, gravelly soil along stream, 2080–2120 m. (US); *Le-Sueur Mex-478* (F); Rio Mayo, Sierra Canelo, *Gentry 2498*, pine-oak meadow, on eroded gully bank (F); Julimes, banks of Conchos River, *Pilsbry 19326*, 1130–1150 m. (US). Sinaloa: Mazatlan, Zellavista, *Ortega 6837* (F); Ymala, *E. Palmer 1714*, 1891; Rosario, Hacienda Chele, *Lamb 482;* Culiacan, *Brandegee s. n.*, Sept. 13, 1904; Mazatlan, *Ortega 6492.* Nayarit: Santiago, *Lamb 615;* Maria Madre Island, Tres Marias Islands, *Nelson 4248;* Acaponeta, *Rose, Standley & Russell 1426;* Acaponeta, *Jones 23028* (F). San Luis Potosi: vicinity of San Luis Potosi, *Parry & Palmer 127*, 6000–8000 ft., 1878; vicinity of San Luis Potosi, *Schaffner 814*, sandy places about the city. Mexico: Valley of Mexico, Santa Fé, *Bourgeau 576* (?), Oct. 3, 1865–1866; Pedrogal, *MacDaniels 778* (F); dry roadside near Texcoco, *Mac-*

Daniels 571 (F); Fed. Dist., San Angel, *Fisher s. n.*, 7480 ft., July 18, 1924 (F); Fed. Dist., Olivar, *Orcutt 3587* (F); Fed. Dist., Xochimulco, *Orcutt 4343* (F); Fed. Dist., Tlalpam, Pyramid of Cuicuilco, *MacDaniels 50*, 7400 ft. (F); Valley of Mexico, Tlalpam, *Harshberger 217;* Valley of Mexico, Popocatepetl, *Purpus 3230.* Guanajuato: la Presa, de los Pozuelas, *Dugès 245*, hills; Yicama del Cerro, *Dugès 243;* Obregon, *Seler 1141.* Durango: Durango City and vicinity, *E. Palmer 490*, 1896. Morelos: valley near Cuantla, *Pringle 8481*, 4000 ft. Aguascalientes: near city of Aguascalientes, *Rose & Painter 7711.* Zacatecas: San Juan Capistrano, *Rose 2430.* Jalisco: near Guadalajara, Barranca de Ablates, *Barnes & Land 112*, fields, 5000 ft. (F); Guadaljara, *Furness s. n.*, 1909 (F). Michoacan: vicinity of Morelia, *Arsène 9010;* Pedregal d'Uruapam, foot of Tancitaro Mt., *Galeotti 3380*, basaltic rocks, 4000 ft. (type of *C. elliptica* Martens & Galeotti in the herbarium of the State Botanic Garden, Brussels). Guerrero: Taxco, *Abbott 368;* Tlidalgo, Taxmalao, *Seler 4241;* Acapulco and vicinity, *E. Palmer 6*, 1895. Chiapas: Buena Vista, *Purpus 9130* (isotypes of *Crotalaria chiapensis* in the herbaria of the Field Museum, Gray Herbarium, and United States National Herbarium). Oaxaca: near Oaxaca, flood plain of the Rio Atoyac, *Camp 2588* (NY); valley of Cuicatlan, *Nelson 1633*, 1800–2500 ft.; Las Naranjas, *Purpus 3229;* Valley of Etla, *Alvarez 765;* Picacho, San Geronimo, *Purpus 6817; Conzatti & Gonzalez 1025*, 1750 m.; Sola, *Galeotti 3186*, calcareous and basaltic rocks, 5000 ft. (Brussels); savannas on the Pacific coast, *Galeotti 3173* (type of *Crotalaria Galeotti* Benth. in the Herbarium of the Royal Botanic Gardens, Kew). Vera Cruz: Tlacomitla, *Purpus 1321*, oak forest (F); Carrizal, *Barnes, Chamberlain & Land 19*, roadsides (F); Zacuapan, Barranca de Tenampa, *Purpus 2915;* Totutla, *Galeotti 3295*, temperate forest, 4000 ft. (type of *Crotalaria elliptica* var. *multiflora* Martens & Galeotti in the Herbarium of the State Botanic Garden, Brussels); Isthmus of Tehauntepec, Coatzacoalcos, *C. L. Smith 997.* Yucatan: flats about Nohpat, also Najcaeab, *Schott 715* (F); Villahermosa, Campeche, *Lundell 1164* (F); Buena Vista, *Gaumer s. n.*, 1899 (F); Real de Monte, *Coulter s. n.* (Kew). Without exact locality: *Sessé, Mociño, Castillo & Moldonado 1920, 1923, 1924, 1930, 1931, 2013* (F). GUATEMALA: Santa Rosa, Rio de Las Cañas, *Heyde & Lux 3735*, 3000 pp.; Chimaltenango, Alameda, *Johnston 915* (F); Peten, La Libertad and vicinity, *Aguilar H. 184* (F). BRITISH HONDURAS: Corozal Dist., *Gentle 258, 634* (F); Corozal Dist., San Andres, *Gentle 1085* (NY). BAHAMA ISLANDS: New Providence, Nassau, *J. I. & A. R. Northrop 67;* New Providence, *Cooper s. n.*, 1881; 3 miles south of Nassau-Blue Hills road, *Wight 74*, among pines; New Providence, Fort Fincastle, *Millspaugh 2501*, old quarry; Nassau, near Fort Montague, along Bay St. to Fox Hill, *Wight 12*, in sand and grass. CUBA: near Matanzas, *Rugel 48*, 1849; Santa Clara, dist. Cienfuegos, Cieneguita, *Combs 219*, poor soil, waste places; Santa Clara, Soledad, near Harvard House, *Senn 391*, potrero; San Cristobal,

San Burtotome, *Wright 2296*, savannas; without exact locality, *Boldo s. n.* (F). JAMAICA: Queen Ann's Bay, *Churchill s. n.*, roadside, Mar. 19, 1897; St. Ann's Bay, south of Gully road, *Harris 10368*, dry hillside (NY). COZUMEL ISLAND: east shore, *Millspaugh 1578* (F, NY); center of the island, *Millspaugh 1566* (F). DOMINICAN REPUBLIC: Barohana, *Fuertes 656*, 350 m. (G, NY). ST. KITTS: *Britton & Cowell 140*, roadside (NY). ANTIGUA: east of St. John, *Rose, Fitch & Russell 3408* (NY). MARTINIQUE: *Duss 818* (NY, US); *Duss 4081* (NY). BARBADOS: Locust Hill, St. George, *Dash 423*, roadside (NY).

This is very widespread and variable, weedy species. The leaf-shape varies from cuneate-obovate to elliptic or oblong. A variety *obcordata* was proposed by Grisebach but the variation on a single plant may be so extreme that it has been considered best to make no varietal segregation. There is also variation in habit from the procumbent plant of the seashore to the more erect one of higher altitudes. There are distinct herbaceous annuals and suffruticose types which are probably perennial. Specimens from dry habitats tend in general to have smaller leaves and fewer flowers per peduncle than do these from moist habitats. In certain forms the standard of the flower tends to be reddish in colour.

28. C. FILIFOLIA Rose in Contr. U. S. Nat. Herb. **5**: 136. pl. 14. 1897. *C. tenuissima* Rose in Contr. U. S. Nat. Herb. **8**: 46. 1903. *C. gracilenta* Rose in Contr. U. S. Nat. Herb. **8**: 313. 1905.—TYPE LOCALITY: "Lava beds near Cuernavaca" (Morelos, Mexico). DISTRIBUTION: Mexico. MEXICO: Sinaloa: San Ignacio, Cerro de Aguajito Campanillas, *Montes & Salazar 578* (US). Nayarit: between Pedro Paulo and San Blascito, *Rose 1981* (type of *C. tenuissima* Rose at the National Herbarium, isotype at the Gray Herbarium). Jalisco: near Etzatlan, *Rose & Painter 7570* (type of *C. gracilenta* Rose at the National Herbarium, isotype at the Gray Herbarium); dry slopes of the mountains above Etzatlan, *Pringle 8857*, 6000 ft. (G, US); Etzatlan, *Pringle 11893* (US); Nuevo Leon: Sierra Madre Oriental, Taray to Santa Ana Canyon, about 15 m. s. w. of Galeana, *C. H. & M. T. Mueller 941*, sparse on shale soil in open oak woods (A). Mexico: dist. Temascaltepec, Nanchititla, *Hinton 4717*, llano (US); Bejucos, *Hinton 8176*, llano (US); *Hinton 1474*, on prairie, 610 m. (US); Tenayac, *Hinton 4835*, llano, 1540 m. (F, US). Morelos: lava beds near Cuernavaca, *Pringle 6553*, 5200 ft. (TYPE at the U. S. National Herbarium, ISOTYPES at the Gray Herbarium and Arnold Arboretum). Guerrero: Los Amates Station, *Pringle 10064*, hills, 2500 ft. (G, US); Coyuca, Balderiama, *Hinton 6498*, hill (F, US). Oaxaca: Cerro Nueve Puntas, Mazatlán, *Conzatti 1506*, 2400 m. (US). Without exact locality, *Sessé, Mociño, Castillo & Moldonado 1908* (F).

There seems to be no adequate justification for maintaining the

three species proposed by Rose as distinct. There are certain variations in leaf-shape and -size, the leaves of *Rose 1981* (*C. tenuissima* Rose) being much longer than those of *Pringle 6553* (TYPE of *C. filifolia* Rose), which has very narrow almost setaceous leaves. There are evidently some variations in habit, some collections being obviously annual plants while others tend to be suffruticose and may be perennial. The flowers and fruits of *Pringle 6553* are somewhat smaller than those of the other sheets examined but not significantly so. Until much more abundant material is available it seems advisable to consider this complex one variable species.

28. C. VITELLINA Ker in Bot. Reg. **6**: t. 447. 1820. *C. cajanifolia* HBK. Nov. Gen. Sp. Pl. **6**: 405. 1824. *C. brasila* Schrank, Syll. Ratisb. **2**: 77. 1828. *C. lotifolia* Poepp. ex Steudel, Bot. Nomencl. ed. 2, **1**: 443. 1840, non Linn. *C. Poeppigii* Presl, Bot. Bemerk. 123. 1844. *C. guatemalensis* Bentham in Kjöben. Vidensk. Meddel. **1-2**: 2. 1853 (Legum. Centroam. 2). *C. Carmioli* Polakowsky, Linnaea **41**: 558. 1877.—TYPE LOCALITY: described from a plant grown at the nursery of Messrs. Colville, in Kings' Road, Chelsea, the plant introduced from "the Brazils." DISTRIBUTION: Mexico, British Honduras, Guatemala, El Salvador, Costa Rica, Panama and locally in Cuba.

KEY TO THE VARIETIES

Leaves glabrous above, pilose beneath.
  Leaflets ovate-elliptic to elliptic-lanceolate.....Var. *typica*.
  Leaflets obovate or obovate-elliptic.....Var. *Orcuttiana*.
Leaves velutinous to pilose above, pilose beneath.....Var. *Schippii*.

Var. TYPICA.—MEXICO: Sinaloa: vicinity of Culiacan, Cofradia, *Brandegee s. n.*, Oct. 31, 1904. Nayarit: Acaponeta, Tiger Mine, *Jones 23035* (NY); vicinity of San Blas, old Spanish road at Singaiba, *Ferris 5542* (A). Jalisco: Sierra Madre Mts., Arroyo de Triangulo, San Sebastian, *Mexia 1326*, streamside, 1425 m. (F); Juanacatlan, *Pringle 9738*, rocky soil, 5000 ft. Tamaulipas: Sierra de San Carlos, vicinity of San José, near crest of range above Mesa de Tierra, *Bartlett 10266* (US); Manzanillo, *E. Palmer 979*, 1890. Tabasco: Tierra Colorada, *Rovirosa 33* (US). Michoacan: vicinity of La Orilla, *Langlassé 159*, 25 m. Michoacan or Guerrero: El Cedral, *Langlassé 305*, 300 m. Guerrero: Acapulco and vicinity, *E. Palmer 217*, 1894–1895; along Cuernavaca-Taxco road, 10 miles from Taxco, *MacDaniels 102*, moist pasture, 5500 ft. (F); Iguala, *Pringle 8437*. Huasteca, Wartenberg near Tantoyuca, *Ervendberg 22*, old fields, 1858. Puebla: Huauchinango, Tepexic, *Fröderstrom & Hultén 1040* (NY); Huauchinango, convalles torrentis Necaxae, *Fröderstrom & Hultén 853*, 1100 m. (F). Chiapas: Jalisco, *Purpus 8891* (F); Jalisco, *Purpus 9132* (F, NY), the sheet in the Herbarium of the New York Botanical Garden bearing one specimen with very long pedicels, evidently due to a disease or

some other type of abnormality. Oaxaca: Rio Cascabel, *Mell 2295* (NY); Salina Cruz, *Deam s. n.*, Dec. 20, 1898, sand. Vera Cruz: Zacuapan, *Purpus 7846;* Sanborn, *Orcutt 3448* (F). Yucatan, Kancabonot, *Gaumer & Sons 23518* (F); Lake Chichancanab, *Gaumer & Sons 23641* (F). Without exact locality: *Sessé, Mociño, Costillo & Moldonado 1918, 1927* (F). GUATEMALA: Costa Grande, Txtacapa, *Bernoulli 535* (photograph in the Gray Herbarium and photograph and fragment in the Herbarium of the Field Museum of Natural History, type of *Crotalaria guatemalensis* Benth.); Gualan, sandbar along the Gualan river, *Deam 6326*, 620 ft. (F, G); Gualan, *Deam 287*, *288*, 420 ft.; Jalapa, Volcano Imay, *Kellerman 7806*, 5000 ft. (F); Dept. Quezaltenango, El Palmar, *Kellerman 6343*, 2300 ft. (F); Dept. Amatitlán Laguna, *Morales Ruano 1261*, 1110 m. (F); Dept. Sololá, Santa Bárbara, *Shannon 571*, 1370 pp. (US); Dept. Retalhulen, Rio Samalá, *Shannon 569* (US); Amatitlan, Laguna, Lake Amatitlan, *Kellerman 5397*, 1200 m. (F); Chimaltenango, Cuilapa, *Johnston 1081* (F); Dept. Esquintla, Finca El Zapote, *Muenscher 12416*, volcanic flow (F); Chimaltenango, Palin-Santa Maria, *Johnston 923* (F); Dept. Escuintla, Escuintla, *J. D. Smith 2321*, 1100 pp.; Amatitlan, Palin, *J. D. Smith 2807*, 3560 ped.; Santa Rosa, Cerro Gordo, *Heyde & Lux 3284*, 3500 ped.; Santa Rosa, Volcan Jumaytepeque, *Heyde & Lux 3716*, 6000 ped. EL SALVADOR: Dept. Ahuachapán, Ahuachapán, *Standley 20250*, sandbar along stream, 800–1000 m.; Dept. La Libertad, vicinity of La Libertad, *Standley 23243*, gravel along river, sea level; Dept. Sonsonate, vicinity of Izalco, *Standley 21863*, thicket; San Vicente, vicinity of San Vicente, *Standley 21188*, sand along river, 350–500 m.; Sonsonate, vicinity of Sonsonate, *Standley 21777*, sand along stream, 220–300 m.; Sonsonate, vicinity of Acajutla, *Standley 21948*, sandy thicket, 30 m. or less; San Salvador, road from San Martín to Laguna de Ilopango, *Standley 22585*, sand; San Salvador, vicinity of San Marcos, *Standley 22791*, moist open bank. COSTA RICA: vicinity of San José, *Standley 34792*, in pasture, 1150 m. (US); Prov. San José, vicinity of San Sebastian, *Standley 32680*, 1150 m. (US); San Pedro de San Ramón, *Brenes 4936*, hills, pastures (F); San José, *Tonduz 776* (F, G, US); Alto de La Cabra de San Ramón, *Brenes 5893* (F); La Palma de San Ramón, *Brenes 11335*, 1100 m. (F); Cerro de Protti, Escasu, *Solis 315* (F); Cartago, *Torres 168* (F); vicinity of San José, *Standley 41205*, wet thicket, 1130 m. (F); San José, *Pittier 776* (F); San José, vicinity of El General, *Skutch 2956*, 880 m. (G, NY); without exact locality, *Polakowsky 306* (photograph in the Gray Herbarium and photograph and fragment in the herbarium of the Field Museum of Natural History, type of *Crotalaria Carmioli* Polakowsky). PANAMA: Prov. Panama, near Panama along Corozal road, *Standley 26864*, moist thicket; Canal Zone, Barro Colorado Island, *Avileo 13* (F); Canal Zone, around Culebra, *Pittier 4783*, 50–150 m. (NY); Cerro Ancón, *Heriberto 135* (NY); without exact locality, *Hayes 17, 39* (NY); Canal Zone, Balboa, Sosa Hill, *Standley 26415*,

brushy slope (A). Cuba: Havana, vicinity of San Pedro, *Leon 7192* (NY); Havana, Cayo La Rosa, *Leon & Edmund 8710* (NY); Santa Clara, Sancti-Spiritus Mts., La Sierra, *Leon & Clement 6443* (NY); without exact locality, *Wright 2295.*

29a. C. vitellina Ker var. **Orcuttiana**, var. nov., a varietate typica differt foliis obovatis vel obovato-ellipticis, apice obtuso vel subretuso.—Mexico: Colima, *Orcutt 4605* (type in the herbarium of the Field Museum of Natural History).

29b. C. vitellina Ker var. **Schippii**, var. nov., a varietate typica differt foliis supra velutinis vel pilosis.—Mexico: Temascaltepec, La Labor, *Hinton 1870,* 2000 m. (US). British Honduras: Stann Creek, *Schipp 493,* along sea beach (type in the Gray Herbarium, isotypes in the herbaria of the Field Museum of Natural History, the New York Botanical Garden and the Arnold Arboretum).

Crotalaria vitellina Ker is an upright tall herb especially characterized by the inflorescence being opposite the leaves and by the brownish markings at the apex of the carina.

Riley (Kew Bull. **1923**: 333, 1923) included a specimen cited as Cofradia, *Brandegee,* under *Crotalaria eriocarpa* Benth. The specimen examined at the Gray Herbarium, Sinaloa, vicinity of Culiacan Cofradia, *Brandegee s. n.*, Oct. 31, 1904, differs from the type of *C. eriocarpa* Benth. by the legume being appressed-pubescent rather than "dense tomentoso-villoso," and by the almost glabrous rather than pubescent standard of the flower.

30. C. maypurensis HBK. Nov. Gen. Sp. Pl. **6**: 403. 1824; Urban, Symb. Antill. **9**: 447. 1928. *C. leptophylla* Bentham in Ann. Nat. Hist. **3**: 430. 1832. *C. Acapulcensis* Hooker & Arnott, Bot. Beech. Voy. Suppl. 414. 1840. *C. anagyroides* Kth. var. *pauciflora* Grisebach, Cat. Pl. Cub. 69. 1866.—Type Locality: "Crescit in ripa Orinoci, prope Maypures." Distribution: Mexico, Guatemala, British Honduras, Honduras, Costa Rica and western Cuba. Mexico: Mexico: dist. Temascaltepec, Tenayac, *Hinton 4854,* llano, 1650 m. (US); Nauchititla, *Hinton 6757,* hill (F); Rincón de Carmen, *Hinton 1626,* 1340 m. (US). Vera Cruz: Huasteca, near Tantoyuca, Wartenberg, *Ervendberg 26.* Guerrero: vicinity of Acapulco, *E. Palmer 319,* 1894–1895. Michoacan or Guerrero: El Calabazal, *Langlassé 475,* sol sableux. Oaxaca: Cañada de San Gabriel, *Conzatti & Gonzalez 381,* 2000 m.; Valley of Oaxaca, *Nelson 1433,* 5500–7500 ft.; Dist. del Centro, Cerro San Felipe, *Conzatti 2307,* 1800 m. (F, G); Totontepec, *Nelson 817* (F); 15–18 km. w. s. w. of Oaxaca, near San Pablo Quatro Venados, cañon of the Rio Zavaleta, *Camp 2533* (NY); Sierra de San Felipe, *Pringle 4818,* 6–7000 ft.; Cuilopan, *L. C. Smith 42,* 5500 ft. Chiapas: Jalisco, *Purpus 8891.* Vera Cruz: Zacuapan, Fortin, *Purpus 8010;* Zacuapan, *Purpus 10910* (F, US); near Zacuapan, *Rozynski*

627 (F); Chavarillo, *Barnes, Chamberlain & Land 21*, hillsides (F); Mirador, *Liebmann 4863* (F); Cousoquitla, *Liebmann 4862* (F). GUATEMALA: Santa Rosa, Volcan Jumaytepeque, *Heyde & Lux 3717* 6000 pp.; Santa Rosa, Buena Vista, *Heyde & Lux 4137*, 5500 ft., (G, US); near Guatemala, sides of Sapoti baranca, *Hayes s. n.*, July, 1860; Dept. Escuintla, Texcuaco, *Morales R. 1075*, 100 m. (F); Jalapa, El Rancho, *Kellerman 7672*, 1000 ft. (F); Dept. Jalapa, Jalapa, *Kellerman 7899*, 4450 ft. (F); Dept. Huehuetenango, above San Sebastian, *Skutch 1199*, bushy mountain side, 6900 ft. (A). BRITISH HONDURAS: without exact locality, *Peck 590*, pine ridges. HONDURAS: Santa Barbara, San Pedro Sula, *Thieme 5187*, 600 pp. (G, US); Cortes, Rio Lindo, *Edwards P-682*, dense tropical forest, 2000 ft. (F). COSTA RICA: Escasu, *Solis 97* (F). PANAMA: Prov. Panama, near Panama, vicinity of Juan Franco race track, *Standley 27740* (US). CUBA: Pinar del Rio, Guane to Mendoza, *Shafer 10574* (F, NY); Pinar del Rio, Laguna Santa Maria, *N. L. & E. G. Britton & Gager 7158*, white sand (NY); Pinar del Rio, Laguna Jovero and vicinity, *Shafer 10762* (NY); 12 km. south of Pinar del Rio City, savanna east of Coloma road, *Leon & Roig 12886* (NY); San Julia, *Wright 2294*, pine grove.

This species is closely related to the following but is distinguished from it by a more slender habit, finer pubescence, and much narrower and smaller leaflets.

31. C. ANAGYROIDES HBK. Nov. Gen. Sp. Pl. **6**: 404. 1824; DC. Prod. **2**: 130. 1825; Grisebach, Fl. Brit. West Ind. 180. 1859; Rock, Legum. Plants Hawaii 135. pl. 136. 1920; Urban, Symb. Antill. **9**: 448. 1928. *C. incana* var. β. Lamarck, Encyc. **2**: 200. 1786. *C. Dombeyana* DC. Prod. **2**: 132. 1825. *C. stipulata* Vellozo, Fl. Flum. 307. 1825; Fl. Flum. Ic. 7. t. 109. 1827.—TYPE LOCALITY: "Crescit prope Caracas, alt. 460 hex." DISTRIBUTION: South America and very locally in Mexico, Honduras and the West Indies. MEXICO: Jalisco: Hacienda of San Marcos, *Pringle 5495*. Colima: foothills of Volcano Colima, *Goldsmith 83*, 7000 ft.; Gro Rio Balsas, *Orcutt 4430* (F). Without exact locality: *Sessé, Mociño, Castillo & Moldonado 3752* (F). HONDURAS: Dept. Atlantida, near Tela, Lancetilla Valley, *Standley 53449*, 20–600 m. (US). ST. VINCENT: *H. H. & G. W. Smith 1034*, open places not far from sea level. TRINIDAD: Lady Chancellor Road, *Britton & Broadway 464*, roadside; St. Ann's, *Broadway s. n.*, Dec. 1, 1919.

This South American species, which has been reported from only a few stations in the region under discussion, may usually be distinguished by its rather coarse, definitely striated, upper branches and axis of the inflorescence.

Doubtful or Excluded Species

Crotalaria alba L. Sp. Pl. 716. 1753. = *Baptisia alba* (L.) R. Br.
C. altissima Sessé & Mociño, Fl. Mex. ed. 2, 166. 1894.

The description of this species is not sufficiently adequate to permit placing it accurately. Perhaps its closest affinities are with *C. vitellina* Ker.

C. bialata Schrank, Pl. Rar. Hort. Monac. t. 13. 1819.

Crotalaria bialata probably belongs in the *C. sagittalis* group, near *C. sagittalis* L. or *C. stipularia* Desv. The illustration shows more or less elliptic leaves throughout the length of the stem as in the latter species but the stipules shown are acute and not falcate as in *C. stipularia* Desv.

C. flexuosa Eaton, Man. Bot. N. Am. ed. 6, 113. 1833; Raf. New Fl. N. Am. **2**: 56. 1836; non Moench, Meth. Suppl. 55. 1802.

This was described from a Carolina specimen as having dentate leaves and spines. It is clearly not a *Crotalaria*.

C. havanensis Gussone in Linnaea, Litt.-Bericht. **4**: 36. 1829.

The description of this species is entirely too inadequate to permit associating it with any of the recognized species or giving it specific status until the type is examined.

C. hexaptera Schrank, Syll. Ratisb. **2**: 79. 1828.

This species has been associated with *C. pilosa* Mill. (*C. pterocaula* Desv.) but the stems of this plant have two fairly broad wings and two ridges rather than six wings as described for *C. hexaptera* Schrank. The type was from a specimen originating in Brazil and cultivated in a greenhouse.

C. pendula Bertero in DC. Prod. **2**: 130. 1825 = *C. laburnifolia* L. Sp. Pl. 715. 1753.

Through the courtesy of the Field Museum a photograph of the type of this species was obtained. The type specimen was grown in a garden in Jamaica. The large flowers with the carina much longer than the alae and the long-stipitate pod indicate that this species is conspecific with the Old World *C. laburnifolia* L. No North American material which could be referred to this species was found in any of the herbaria examined.

C. perfoliata L. Sp. Pl. 714. 1753. = *Baptisia perfoliata* (L.) R. Br.
C. undulata Knowles & Westcott, Fl. Cab. **2**: 158. 1838.

This species probably is synonymous with *C. sagittalis* L. or one of

the closely related species but the description is too inadequate to place it accurately in this difficult and variable group. The type was a specimen grown in England in 1837 by G. Barker Esq. from seed sent from Mexico.

Division of Botany and Plant Pathology,
Science Service, Department of Agriculture,
Ottawa, Canada

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I. SOME NOTES ON THE BOTANICAL RELATION BETWEEN NORTH AMERICA AND EASTERN ASIA

HIROSHI HARA

ON making a critical comparison between North American plants and eastern Asiatic ones, I recognized that the plants on both continents are often closely related, as many authors have already pointed out. Here I want to explain some cases in which several questions have until now remained unsettled.

My study is being carried on in the Gray Herbarium under the supervision of Prof. Fernald to whom I wish to express my heartiest gratitude for his very kind and helpful advice.

1. RANUNCULUS GMELINI AND R. PURSHII.—The relation between the two was discussed in detail by Litvinow in Sched. Fl. Ross. in 1922, but more recent authors have often disagreed with his opinion. Hultén stated in the note under *R. Gmelini* in his Fl. Kamt. II that the closely related *R. Purshii* Hooker, extending throughout N. America, is probably to be regarded as a separate species, although he referred Alaskan material to *R. Gmelini*, while Komarov adopted the name *R. Purshii* for his Kamchatkan material. Ovczinnikov as well as American authors have treated all Asiatic material as *R. Gmelini* and all American as *R. Purshii*. To settle the question, I compared a large number of American specimens with those from Jakutsk, Transbaicalia, Kamchatka and Saghalien, but I did not find any constant characters by which these could be separated into two distinct species.

I found that some American specimens, for example those from Minnesota and Michigan, agree exactly with the Asiatic plant. So I think that both plants, American and Asiatic, can not be distinguished as independent species. The American ones, however, have generally more robust growth and thicker stems, larger leaves with broader lobes, larger flowers, broader petals and a larger fruit-cluster, with a globular receptacle, and they may be called *R. Gmelini* var. *Purshii* (Hook.). An emersed form which is strongly hairy and is not known from Eastern Asia is var. *limosus* (Nuttall), and another emersed form endemic in N. America is var. *prolificus* (Fernald).

Ranunculus Gmelini DC., Syst. Veg. I, p. 303 (1818); Schlechtendal, Animadv. Ranuncul. Candol. II. p. 35 (1820); DC., Prodr. I, p. 35 (1824); Litvinov in Sched. Herb. Fl. Ross. VIII, p. 53 (1922); Hultén, Fl. Kamt. II, p. 125 (1928); Ovczinnikov in Komarov. Fl. URSS. VII, p. 354 (1937).—*Ranunculus foliis duplicato trifidis*, etc. J. Gmelin, Fl. Sibir. VI, p. 203, t. 83a, fig. B (1769). *R. pusillus* (non Poiret 1804) Lebebour in Mém. Acad. Imp. Sci. St.-Pétersb. V, p. 546 (1815). *R. Langsdorfi* DC., Prodr. I, p. 34 (1824). *R. sibiricus* Sprengel, Syst. II, p. 652 (1825). *R. Purshii* (non Richardson) Koidzumi, Fl. Saghal. Nakahara p. 65 (1910); Komarov, Fl. Penin. Kamt. II, p. 137 (1929). *R. multifidus* (non Pursh) Nakai in Bot. Mag. Tokyo XXI, p. 126 (1907). *R. Fauriei* Léveillé in Fedde, Rep. VII, p. 101 (1909). *R. radicans* (C. A. Meyer) Miyabe et Miyake, Fl. Saghal. p. 13 (1915); Kudo, Rep. Veg. N. Saghal. p. 136 (1924).

Nom. Jap. Karakusa-kinpôge.

Var. **Purshii** (Richardson), comb. nov. *R. Purshii* Richardson in Franklin, 1st. Journ. App. ed. I, p. 741 (repr. p. 13) (1823) and App. ed. 2, p. 751 (repr. p. 23) (1823); Hooker, Fl. Bor.-Amer. I, p. 15, t. 7. B (1833); Torrey et Gray, Fl. N. Amer. I, p. 19 (1838); A. Gray, Synop. Fl. N. Amer. I, p. 24 (1895); Fernald in Rhodora XXXVIII, p. 173 (1936). *R. yukonensis* Britton in Bull. New York. Bot. Gard. II, p. 169 (1901).

Var. **limosus** (Nuttall), comb. nov. *R. limosus* Nuttall in Torrey et Gray, Fl. N. Amer. I, p. 20 (1838). *R. multifidus* var. *limosus* (Nuttall) Lawson, Rev. Canad. Ranuncul. p. 47 (1884).

Var. **prolificus** (Fernald), comb. nov. *R. multifidus* var. *terrestris* Gray, Man. ed. 5, p. 41 (1867). *R. Purshii* var. *prolificus* Fernald in Rhodora XIX, p. 135 (1917).

2. Circaea quadrisulcata (Maximowicz) Franchet et Savatier, Enum. Pl. Jap. I-1, p. 169 (1874) quoad syn. tantum, excl. specim. et icon.—*C. lutetiana* (non L.) auct. Asia-orient. *C. lutetiana* L. f. *quadrisulcata* Maximowicz, Prim. Fl. Amur. p. 106 in textu (1859). *C. lutetiana* L. var. *quadrisulcata* Maximowicz ex Ascherson et Magnus in Bot. Zeit. XXVIII, p. 783 (1870). *C. lutetiana* subsp. *quadrisulcata* Maximowicz, l. c. p. 787 (1870). *C. mollis* Sieb. et Zucc. var. *Maxi-*

mowiczii Léveillé in Bull. Geogr. Bot. XXI, p. 223 (1912). *C. Maximowiczii* (Lév.) Hara in Journ. Jap. Bot. X, p. 598, f. 13 (1934).—Bracteæ inconspicuæ punctatæ. Sepala vulgo fusco-rubra glanduloso-pilosa. Petala vulgo rosea.

var. **canadensis** (L.), comb. nov. *Circaea lutetiana* (non L.) auct. Amer. *C. lutetiana* β. *canadensis* Linnaeus, Sp. Pl. ed. 1, I, p. 9 (1753). *C. latifolia* Hill, Brit. Herb. p. 138 (1756) nomen illegitimum; Fernald in Rhodora XVII, p. 222 (1915); l. c. XIX, p. 87 (1917).—Bracteæ minutæ saepe setaceæ. Sepala vulgo viridia parce glanduloso-pilosa vel glabrescentia. Petala vulgo alba.

3. Galium trifidum.—In Europe, *Galium trifidum* L. is represented by a single form, but in North America and eastern Asia it differentiates into several forms. In 1897, Wiegand described two varieties from western North America, var. *subbiflorum* and var. *pacificum*, the former as having larger narrow leaves and sometimes stout nearly glabrous and rarely 2- or 3-flowered pedicels, and the latter as having larger and broader leaves, and capillary, scabrous, solitary and arcuate pedicels. The differences between the two varieties are, however, rather mechanical, and we sometimes meet with such a specimen as we can not decide to which variety it should be referred. Even Wiegand himself seems not to be sure in separating the two varieties. In the note of the original description of var. *pacificum*, he added that some Washington specimens had nearly glabrous pedicels, and in Rhodora XII, p. 229, that var. *subbiflorum* had often very slightly prickly peduncles. Besides that, the specimen from California (*Parish* no. 1505, 1882) which was cited in the original description of var. *subbiflorum* was later identified as var. *pacificum* by Wiegand himself. On examining the specimens identified by Wiegand, I found a form with narrow leaves or with short 3-rayed peduncles in his var. *pacificum*, and a form with broad leaves in his var. *subbiflorum*. Hultén recently reported from western North America subsp. *columbianum* (Rydberg) which was said to differ from var. *pacificum* by having 5 or 6 leaves in the upper whorls and 2- or 3-flowered pedicels, but those differences are also artificial and the authentic specimens of var. *pacificum* sometimes show the same characters. Thus the three plants from western North America above mentioned should be united under the name of var. *pacificum*, I think, and this variety should be separated from typical *G. trifidum* by a little more robust habit, and by having pedicels glabrous or slightly scabrous, sometimes shorter and 2- or 3-flowered, and larger leaves which have a tendency to number 5 in a whorl. It is distributed

widely from North America to eastern Asia, and var. *brevipeduncula-tum* Regel (1861) from Ussuri may be identical with it, although its brief description is not enough to settle the question. Another trouble is that var. *subbiflorum* recently has been treated as a variety of *G. tinctorium* L. (*G. Claytoni* Michx.). I have examined a multitude of specimens but have failed to find any constant differences between var. *pacificum* (including var. *subbiflorum*) and *G. tinctorium* as well as those between var. *pacificum* and *G. trifidum*. *G. tinctorium* in this typical form is clearly distinguished from *G. trifidum* by its robust growth, its leaves generally in 5 or 6's, its short pedicels straight and glabrous in 3-rayed bracteate umbels, but both plants are connected through var. *pacificum* by a complete series of intermediate forms. Therefore, judging from the material examined, I conclude that the plants above discussed should belong to a single circumpolar species differentiated into 3 geographical varieties or subspecies, the typical *G. trifidum* in Europe and North America, var. *pacificum* in North America and Eastern Asia, and the other extreme, subsp. *tinctorium* (L.), endemic in eastern N. America. The above synonymy is briefly summarized as follows:

Galium trifidum L. Sp. Pl. ed. 1, I, 105 (1753); Wiegand in Bull. Torrey Bot. Cl. XXIV, 399 (1897).

Var. pacificum Wiegand in Bull. Torrey Bot. Cl. XXIV, 391 & 400 (1897); Hara in Bot. Mag. Tokyo LI, 839 (1937). *G. trifidum* var. *subbiflorum* Wiegand, l. c. 391 & 399 (1897). *G. subbiflorum* (Wiegand) Rydberg in Bull. Torr. Bot. Cl. XXXIII, 152 (1906). *G. Claytoni* var. *subbiflorum* (Wiegand) Wiegand in Rhodora XII, 229 (1910). *G. columbianum* Rydberg, Fl. Rocky Mts. 808 & 1066 (1917). *G. tinctorium* var. *subbiflorum* (Wiegand) Fernald in Rhodora XXXIX, 320 (1937). *G. trifidum* subsp. *columbianum* (Rydberg) Hultén, Fl. Aleut. 307 (1937).

Subsp. **tinctorium** (L.), comb. nov. *G. tinctorium* L. Sp. Pl. ed. 1, I, 106 (1753).—Fernald in Rhodora XXXVII, 445, pl. 403 fig 1–2 (1935). *G. Claytoni* Michaux, Fl. Bor.-Amer. I, 78 (1803); Wiegand, l. c. 400 (1897). *G. trifidum* β. *tinctorium* (L.) Torrey et Gray, Fl. N. Amer. II, p. 22 (1841).

4. Erigeron acris Group.—*Erigeron elongatus* Ledebour (1829), which has recently been applied to the plant with glabrescent involucres in N. America, Northern Asia and Northern Europe is not valid, as it has an earlier homonym, i. e. *E. elongatus* Moench (1802).

E. droebachensis was based on the plate 874 of Flora Danica and this binomial was validated for the first time by Retzius in Fl. Scand.

Prodr. ed. 2, p. 194, no. 1010 (1795). It may be identical with the plant in question, but most Scandinavian authors have rejected the name for the reason that they can not judge from its figure and its brief description whether it is the plant in question or is merely a form of *E. acris*, and the exact application of the name is quite doubtful.

The second name given to this group is *E. angulosus* Gaudin Fl. Helv. V, 265 (1829) described from the European Alps. The photograph of the type specimen in Herb. Inst. Bot. Univ. Lausanne in Switzerland is at my disposal through the courtesy of Prof. Maillefer and of Prof. Fernald to whom I express my sincerest thanks. Although *E. angulosus* has always narrow linear leaves, it agrees well with our plant in the hairiness on involucres and peduncles, the shape and size of involucral bracts, the length of pappus, etc. and I can not find any constant characteristics to separate the plants specifically. The common form in Eastern Asia and North America with broader leaves and sparsely hairy stems is without doubt identical with *E. kamtschaticus* DC., and should be considered as a variety of *E. angulosus*. This treatment, however, is only provisional, as the group of *E. acris* needs further critical study. When *E. acris* and *E. angulosus* are compared in their typical forms, they are quite distinct, but puzzling intermediate forms are sometimes found.

Erigeron angulosus Gaudin, Fl. Helv. V, p. 265 (1829); Koch, Synop. Fl. Germ. et Helv. ed. 1, p. 354 (1837). *E. droebachensis* b. *angulosus* (Gaudin) Reichenbach, Icon. Fl. Germ. et Helv. XVI, p. 11, t. 916-II (1854). *E. acris* β. *glabratus* Neilreich, Fl. Nied.-Oester. p. 331 (1859). *E. acris* forme I. *E. angulosus* Gaudin ex Rouy et Camus, Fl. Franc. VIII, p. 153 (1903). *Trimorpha angulosa* (Gaudin) Vierhapper in Beih. Bot. Centralbl. XIX-2, p. 423 (1906). *E. acris* subsp. *angulosus* (Gaudin) Vollmann, Fl. Bayern p. 725 (1914); Hegi, Fl. Mitt.-Europ. VI-1, p. 438 (1917).

Var. **kamtschaticus** (DC.), comb. nov. *Erigeron elongatus* Ledebour, Icon. Fl. Alt. I, p. 9, t. 31 (1829), Fl. Alt. IV, p. 91 (1833) and Fl. Ross. II, p. 487 (1845); DC., Prodr. V, p. 291 (1836); Fries, Novit. Fl. Suec. III, p. 108 (1842); Hartman, Handb. Scand. Fl. ed. 4, p. 270 (1843) and ed. 11, p. 9 (1870); Blytt, Norg. Fl. p. 563 (1861); Hultén, Fl. Kamt. IV, p. 160 (1930); Fernald in Rhodora XL, p. 346 (1938); not *E. elongatus* Moench, Method. Pl. Suppl. p. 247 (1802). *E. kamtschaticus* DC., Prodr. V, p. 290 (1836); Ledebour, Fl. Ross. II, p. 488 (1845); Koidzumi in Bot. Mag. Tokyo XXXI, p. 139 (1917); Komarov, Fl. Penin. Kamt. III, p. 126 (1930). *E. acris* var. *kamtschaticus* (DC.) Herder in Bull. Soc. Nat. Moscou XXXVIII-1, p. 392

(1865). *E. acris* ζ. *elongatus* (Ledeb.) Herder, l. c. *E. kamtschaticus* var. *hirsuta* Fr. Schmidt, Reis. Amur. u. Sachal. p. 147 (1868); Koidz. l. c. 140 (1917). *E. acer* var. *manshuricus* Komarov, Fl. Mansh. III, p. 610 (1907). *Trimorpha elongata* (Ledeb.) Vierhapper, l. c. p. 424 (1906); Lindman, Svensk Fanerog. p. 529 (1918). *E. acre* var. *hirsutum* (Fr. Schm.) Miyabe et Miyake, Fl. Saghal. p. 240 (1915); Hara in Bot. Mag. Tokyo LII, p. 70 (1938). *E. acris* (non L.) auct. Amer. et Japon; Kitamura, Comp. Jap. I, 324 (1937). *E. kamtschaticus* var. *manshuricus* Koidz., l. c. 140 (1917).

5. Anaphalis margaritacea.—Several forms have been described in this widely distributed species in North America and eastern Asia, but the relation between those forms has not been fully studied as yet. As pointed out by Profs. Fernald and Wiegand,[1] var. *occidentalis* Greene, with broad leaves shining green above, is regarded as the common form in the northern and western part of N. America and eastern Asia. Really the eastern Asiatic form agrees well with the western North American, although specimens from northeastern North America have somewhat larger heads and more obtuse involucral bracts. The oldest name for this variety is var. *intermedia* or *kamtschatica* Herder, which, however, should be considered as the typical form of the Linnean *Gnaphalium margaritaceum*, as Prof. Fernald[2] has recently cleared up the case.

A form with narrow green leaves about 5 mm. broad is called var. *angustior* (Miquel) Nakai in Japan, while it is called var. *revoluta* Suksdorf (= f. *anochlora* Fernald) in North America. Japanese specimens which are not uncommon in the middle part of Honshu have hardly any difference from the isotype of var. *revoluta* which I have examined. And the earliest varietal epithet for this form is *angustior*.

In January 1937, I published var. *intercedens*, which has narrow leaves lanate on both sides and occurs in gravelly places of northern Japan. To my surprise, it agrees well with var. *revoluta* f. *arachnoidea* Fernald which is common in eastern North America and had long been considered as the typical form of *A. margaritacea* (L.).

The above three varieties are often connected by intermediate forms; the distinction between var. *intermedia* and var. *angustior* especially is not clear in Japan. *Gnaphalium margaritaceum* α. *genuinum* or *americanum* Herder is a mixture of more than two varieties.

[1] Rhodora XIII, p. 26 & 27 (1911).
[2] Rhodora XL, p. 218 (1938).

Another form, var. *subalpina* Gray, is at present endemic in North America, and subsp. *japonica* (Schulz.-Bip.) Kitamura and subsp. *yedoensis* (Franch. et Sav.) Kitamura are endemic in Japan.

ANAPHALIS MARGARITACEA (L.) Bentham et Hooker fil., Gen. Pl. II, p. 303 (1873). *Gnaphalium margaritaceum* Linnaeus, Sp. Pl. ed. 1, II, p. 850 (1753).

Var. TYPICA. *Gnaphalium margaritaceum* β. *intermedium* s. *kamtschaticum* Herder in Bull. Soc. Imp. Nat. Moscou XL.-1, p. 415 (1867). *Anaphalis margaritacea* var. *occidentalis* Greene, Fl. Francis. IV, p. 399 (1897). *A. margaritacea* f. *latifolia* Kudo, Fl. Param. p. 165 (1922).

Var. ANGUSTIOR (Miquel) Nakai in Bot. Mag. Tokyo XL, p. 148 (1926). *Antennaria cinnamomea* DC. β. ? *angustior* Miquel, Ann. Mus. Bot. Lugd.-Bat. II, p. 178 (1866). *Anaphalis margaritacea* var. *revoluta* Suksdorf in All. Bot. Zeits. XII, p. 7 (1906). *Anaphalis margaritacea* f. *anochlora* Fernald in RHODORA XXIV, p. 205 (1922). *Anaphalis margaritacea* subsp. *angustior* (Miq.) Kitamura, Comp. Jap. I, p. 243 (Dec. 1937). *Anaphalis margaritacea* subsp. *angustior* (Miq.) Kitamura et Hara in Bot. Mag. Tokyo LII, p. 2 (Jan. 1938).

Var. INTERCEDENS Hara, l. c. p. 3 (Jan. 1938). *Anaphalis margaritacea* (non L.) Fernald et Wiegand in RHODORA XIII, p. 26 (1911). *A. margaritacea* var. *revoluta* f. *arachnoidea* Fernald in RHODORA XL, p. 219 (May 1938).

6. SAGINA MAXIMA.—*Sagina maxima* A. Gray has hitherto been applied to the common species in Japan and China which is characterized by having very minutely echinate seeds, and which is now called *S. japonica* (Sw.) Ohwi.[1] The examination of the type specimen of *S. maxima* preserved in the Gray Herbarium, however, proves that it is nothing but an elongate form of *S. litoralis* Hultén which is not uncommon in the coastal region of east Asia. The type specimen of *S. maxima* was collected by C. Wright at Hakodata in Hokkaido. In general appearance, it resembles *S. japonica;* its stems are rather slender, attaining 20 cm. long; its calyces also sparsely glandular-hairy. But its seeds have somewhat obscure flat rounded tubercles on the surface, and this last character clearly shows that the plant is not identical with *S. japonica.* As pointed out first by Prof. Nakai *S. litoralis* is closely allied to *S. crassicaulis* Watson, described from California, which has quite glabrous pedicels and calyces and nearly

[1] SAGINA JAPONICA (Sw.) Ohwi in Journ. Jap. Bot. XIII, 438 (1937). *S. procumbens* (non L.) Thunberg, Fl. Jap. p. 80 (1784). *Spergula japonica* Sw. ex Steudel, Nom. Bot. ed. 1, 802 (1821). *Spergella japonica* Sw. ex Steudel, l. c. ed. 2, II, 617 (1841). *Sagina sinensis* Hance in Journ. Bot. VI, 46 (1868). *Sagina maxima* (non A. Gray) auct. plur.; Nakai in Bot. Mag. Tokyo XXXVIII, [230] (1924); Steinberg in Fl. URSS. VI, 473, tab. XXV, fig. 8. (1936).

smooth seeds, although both plants, *S. litoralis* and *S. crassicaulis*, are found in northern Japan, in their typical form. I came to the conclusion, considering the occurrence of several intermediate forms, that *S. litoralis* should be regarded as a geographical variety of *S. crassicaulis* and made the combination *S. crassicaulis* var. *littorea* (Makino) for the former in Journal of Japanese Botany XIII, p. 556 (1937). But now, as *S. maxima* A. Gray antedates Watson's name by 24 years, I must change the combination as follows.

SAGINA MAXIMA A. Gray, Bot. Jap. p. 382 (1859) in adnota. *S. Linnaei* Presl var. *maxima* (A. Gray) Maximowicz in Bull. Acad. Imp. Sc. St. Pétersb. XVIII, p. 372 (1873) pro parte; Matsumura, Ind. Pl. Jap. II-2, p. 86 (1912) pro parte. *S. maxima* f. *littorea* Makino in Bot. Mag. Tokyo XXV, p. 156 (1911). *S. litoralis* Hultén, Fl. Kamt. II, p. 78, fig. 8 (1928) and IV, p. 248 (1930); Komarov, Fl. Penin. Kamt. II, p. 102 (1929); Steinberg in Fl. URSS. VI, p. 473, t. XXV, fig. 7 (1936); Hultén, Fl. Aleut. p. 169 (1937). *S. crassicaulis* var. *littorea* (Makino) Hara in Journ. Jap. Bot. XIII, p. 556 (1937).

Var. **crassicaulis** (Watson), comb. nov. *Sagina crassicaulis* Watson in Proc. Amer. Acad. XVIII, p. 191 (1883); Hultén, Fl. Aleut. p. 168 (1937); Hara, l. c. (1937).

II. THE CRUCIFEROUS GENUS PHYSARIA

REED C. ROLLINS[1]

(Plate 556)

THE Cruciferae are highly developed in western North America both as to the number of biological entities present and the extent of their divergence from any single morphological pattern. A number of genera, including *Physaria*, are unique in being wholly confined to this area and in that they are apparently of comparatively recent origin. These features together with the fact that *Physaria* has never been intensively examined make a study of certain aspects of its ecology, cytology, morphology, speciation and the relationships of its species seem highly desirable. With these points in mind, an investigation of the genus was undertaken involving detailed observations in the field and in the laboratory. The results are presented in the paragraphs that follow.

Physaria occurs in the Upper Sonoran, Transition, Montane and lower Canadian life-zones, chiefly on high plateaus and lower moun-

[1] Society of Fellows of Harvard University.

tain elevations, from the great plains to the Cascades and Sierra Nevada and from Canada to Arizona and New Mexico. In general the habitat is of a dry barren sort, where sunlight is intense and competition between plant species and individuals often approaches a minimum, but where survival entails special adaptation. The xeric conditions under which the plants survive is reflected in the abundant, often densely encrusted vestiture found upon them. Though the Cruciferae have long been famous for the lime-preference which its members show, *Physaria*, as is true of several other genera in the family, seems to be somewhat less selective. This is particularly true of certain species. The plants often occupy siliceous soils of a loose nature or are equally at home on heavily lime-impregnated shale outcrops.

The natural relationship between *Physaria* and *Lesquerella* is very marked. These two genera have almost exactly the same floral pattern, habit of growth and vestiture, which is of a distinctive sort. The siliques too are very similar. In fact the two are not easily recognized as distinct genera if only flowering plants are considered. The fruit of *Physaria* is always didymous, markedly constricted at the replum and usually highly inflated, while that of *Lesquerella* is unconstricted at the replum, never didymous and much less inflated. But even in these respects certain species of *Lesquerella*, namely *L. Kingii* and its close relatives, approach the condition found in such species of *Physaria* as *P. Geyeri*. This relationship was pointed out by Payson,[1] but was disregarded or overlooked by O. E. Schulz[2] who recently placed the two genera in widely separated tribes of the family. The cytological evidence also indicates a closer relationship than that attributed to them by Schulz. On the other hand there is no question as to the separateness of these two genera.

Three species of *Physaria* have been investigated cytologically, the chromosome number having been found to be N = 4 in each case (text figs. 1 & 2). These counts, the first for the genus, were made from aceto-carmine smears of developing pollen. Buds from wild plants were killed and fixed in alcohol-acetic in the field at the following localities: *P. acutifolia* Rydb., N = 4, dry hillsides, granitic talus, 5 mi. east of Parlin, Gunnison Co., Colo., May 21, 1938, *Rollins 2088* (G, R); *P. floribunda* Rydb., N = 4, dry rocky hillside, 3 mi. east of

[1] Ann. Mo. Bot. Gard. 8: 129 (1921).
[2] Natur. Pflanzenfam. 17*b* (1936).

Sapinero, Gunnison Co., Colo., May 23, 1938, *Rollins 2108* (G, R); *P. australis* (Pays.) Rollins, N = 4, limy knoll, 3 mi. west of Fort Bridger, Uinta Co., Wyoming, *Rollins 2229* (G, R). If these results may be taken as indicative, then the basic or fundamental number for *Physaria* must be four.

It has been suggested by Payson (*l. c.*) that *Physaria* was derived from *Lesquerella*. His suggestion was based chiefly on morphological studies, but is equally supported by the present cytological observations on both genera. Chromosome numbers of 2N = 10, 18 and 12 have been reported for *Lesquerella* by Manton.[1] I have found N = 5 for four species, N = 6 for one species and N = 8 for another species

FIG. 1. Chromosomes in a developing pollen grain of PHYSARIA FLORIBUNDA Rydb. *Rollins* no. 2108. × about 1000.
FIG. 2. Chromosomes in a dividing pollen mother cell of P. ACUTIFOLIA Rydb. *Rollins* no. 2088. × about 1000.

of the same genus. N = 5 and 6 coincide with the findings of Manton, but the discovery of N = 8 further indicates a probable aneuploid relationship between species of the genus. A cytological study of *Lesquerella* has not proceeded far enough for the accurate determination of its basic chromosome number, but since N = 5 is lowest and most commonly found, in all probability, it represents one of the fundamental numbers for the genus. If this is true, then the case of *Physaria* and *Lesquerella* may be added as a further example of the aneuploid relationship between genera of the Cruciferae so lucidly described by Manton. In any case it seems probable that the loss of a single chromosome from the complement of five found in certain members of Eu-Lesquerella has been of major importance in the genesis of *Physaria*.

Several inter-related groups of species are found in *Physaria*, but

[1] Ann. Bot. **46**: 531 (1932).

none are sufficiently distinct and definable to make necessary or desirable a subdivision of the genus. In fact each is connected with another through a continuous chain of intermediate species. Probably the most natural aggregation is that made up of *P. Geyeri*, *P. oregona*, *P. alpestris* and *P. Newberryi*. Of these, the former two species show a closer relationship between one another than with either of the latter two. The following may be noted as characteristics commonly shared by members of this group: shallow apical sinus, ovate to ovate-lanceolate replum with an acute apical angle, valves compressed opposite the replum-axis and the lack of a basal sinus. The ovule-number ranges from 2 to 6 in each loculus of the silique among members of this group. There is apparently a straightforward evolutionary trend expressed among these species which becomes increasingly evident when the structural relationships of the fruits are thoughtfully considered. The most striking changes have apparently accompanied a reduction in the number of ovules. These include a progressive sterilization of ovuliferous tissue along the outer margins of the replum. This tissue when relieved of its ovule-bearing function appears to have been converted into tissue of the style. The result has been a shortening of the replum and an increase in the length of the style. If one attempts to arrange the species of this group in a probable evolutionary sequence, invariably *P. oregona* comes out as the most primitive. From the primitive stock, *P. Geyeri* and *P. alpestris* appear to be direct descendants. The genesis of *P. Newberryi* may be the same, but the relationship here is not quite so evident. *P. Chambersii* seems to be transitionary toward other members of the genus. Its silique has certain features in common with *P. alpestris*, but the replum resembles that of *P. floribunda*.

Another natural grouping includes *P. didymocarpa*, *P. condensata* and *P. australis*. Here as in the above we see a progressive reduction in ovule-number, lengthening of style and shortening of replum which results in a greater constriction between the valves. Several types of divergence from the primitive *P. didymocarpa* are notable. *P. condensata* shows the extreme in reduction of growth-form and must surely be a derived species. Another divergence is found in *P. didymocarpa* var. *lanata* in which the entire body of the plants is invested in the same loose pubescence characteristic of only the silique in the species proper. The number of ovules in each ovary-loculus has been reduced to two and the replum has become exceedingly short and

constricted in *P. australis*. This species appears to be the natural link to the third group of inter-related species to which *P. vitulifera, P. Osterhoutii, P. brassicoides, P. acutifolia, P. floribunda* and *P. Grahamii* belong. These species all possess moderately inflated siliques and the ovule-number is uniformly two for each loculus of the ovary. No very marked evolutionary trends are evident, hence any attempt to arrange the species according to the probable order of their origin would be little short of pure speculation. However, certain of the species are more closely related than others. For example, *P. vitulifera* and *P. Osterhoutii* are obviously closely inter-related as are also *P. floribunda* and *P. acutifolia*.

All the known species of *Physaria* are perennial and possess a relatively large central tap-root. The plants are caespitose, with herbaceous flowering stems arising laterally on an elongated woody, usually simple caudex. The basal leaves are borne along the caudex and subtend the flowering stems. These leaves invariably form a sterile rosette on the terminal portion of the caudex or caudex-branch, imparting a characteristic symmetry to the plants as they are observed in their native habitats. This rosette-habit is found in its extreme form in *P. condensata*, where most of the plant is simply "rosette." The shape, size and degree of toothing of the leaves varies between species, but there is a certain amount of stability on these features within any given entity. There is a tendency for the leaves to be entire, or at most remotely dentate, in most species of the genus. However, certain species have the basal leaves dissected.

The flower-parts are reasonably uniform throughout the genus and offer little of diagnostic value in distinguishing between species. The sepals are recognizable as two pairs, one being broader than the other. They are always pubescent with the same type of indument which is found on the rest of the plant. The petals are glabrous, entire, yellow and nearly spatulate. There is little differentiation between blade and claw, but the two pairs of petals differ in width. Characters of the fruit are highly important in indicating relationships and are extremely useful in the delimitation of natural entities. This point was adequately emphasized by Robinson[1] who said of *Physaria*, "species with excellent characters in the fruit, but otherwise very difficult to distinguish." The siliques are pubescent, didymous, variously shaped and possess a sinus at both base and apex or at apex only. The replum

[1] Syn. Fl. 1: 121 (1895).

is an important diagnostic character which has previously been almost entirely overlooked. Shape, apical angle and dimensions are all important considerations. The number of ovules in each loculus of the silique is a constant feature of several species. This constancy seems to be correlated with a reduced number. Abortion is so common in *Physaria* that it is the normal condition. Species with four or more ovules in each loculus normally develop two or three seeds and species with two ovules in each loculus usually develop only a single seed. The style is persistent and varies in length, but within limits the style is a useful character for distinguishing certain species.

The seeds are wingless and fairly uniform throughout the genus, differing only in dimensions. Within the seeds, the cotyledons are consistently accumbent. The indument varies only slightly, being always of the many-rayed stellate type. The rays are nearly always forked, but vary in length and the degree to which they are appressed to the plant-surface. In *P. Grahamii* and *P. didymocarpa* var. *lanata* the stellae are sufficiently long and spreading to give a lanate appearance to the plants. Uniform in type, covering the entire mature plants and nearly always giving them a silvery appearance, the vestiture cannot be considered of major importance in specific delimitation as is the case in many genera of the Cruciferae. Plants of *Physaria* have been grown in a greenhouse where observations were made on their ontogenetic development. In a young plant the cotyledons are perfectly glabrous, strikingly in contrast with the first pair of true leaves which are heavily incrusted with stellae. In general habit plants grown under artificial conditions differ in no marked way from those which one observes in nature.

Nuttall is credited with the recognition of *Physaria* as a distinct entity by his having been listed as the author of section *Physaria* of the genus *Vesicaria* by Torrey and Gray.[1] After the publication of a second species in the group by Hooker,[2] Gray[3] realized that the plants belonged to a different genus and accordingly raised section *Physaria* to generic rank and at the same time transferred *Vesicaria didymocarpa* and *V. Geyeri* to it. The generic status of *Physaria* as a biological category has never been questioned by subsequent workers. O. Kuntze[4] substituted the name *Coulterina* for *Physaria*, contending

[1] Fl. North Am. **1**: 102 (1838).
[2] Lond. Journ. Bot. **6**: 70 (1847).
[3] Gen. Illustr. **1**: 162 (1848).
[4] Revis. Gen. **2**: 931 (1891).

that the fungus genus *Physarium* preoccupied the name. However, no such interpretation is possible under specific provisions of the International Rules of Botanical Nomenclature. *Physaria* has been studied in parts by the writers of manuals on the botany of western America, but the nearest approach to an inclusive treatment of the genus is that of Payson,[1] in which a key and notes on the distribution of the species are presented.

It is a pleasure to acknowledge unreserved cooperation from the following public or private herbaria in connection with this study: Clokey Herbarium (Cl); Gray Herbarium (G); New York Botanical Garden (NY); North Dakota Agricultural College (NDA); Rocky Mountain Herbarium (RM); United States National Herbarium (US). Collections bearing the symbol (R) are in my own herbarium.

Synopsis of the Genus Physaria (Nutt.) Gray

Perennial, caespitose, silvery stellate; stems simple, arising laterally on a somewhat elongated caudex; basal leaves usually numerous, often terminating the caudex or its branches in rosette, form, petiolate, oblanceolate to obovate or the blade rotund, entire, dentate or divided into segments; cauline leaves present, usually few, entire or dentate; inflorescence congested to somewhat elongated, usually elongating in fruit; pedicels rigid; sepals linear-oblong, pubescent, often cucullate at apex; petals yellow or rarely purplish, usually spatulate, glabrous; siliques didymous, pubescent, often highly inflated, apical sinus present; ovules 2–6 in each loculus; style persistent; seeds brown, wingless.—Gray, Gen. Illustr. **1**: 162 (1848); Coulter, Man. Rky. Mt. Region 26 (1885); Prantl in Engler & Prantl, Nat. Pflanzenfam. **3**: 187 (1891); Robinson in Gray, Syn. Fl. N. Am. **1**: 121 (1895); Howell, Fl. Northw. Am. **1**. 52 (1897); Britt. & Brown, Ill. Fl. **2**: 135 (1897); Heller, Cat. N. Am. Pl. 88 (1900); Rydb., Fl. Colo. 154 (1906); Coulter & Nelson, Man. Cent. Rky. Mts. 217 (1909); Hayek in Beih. Bot. Centr. **27**: 311 (1911); Frye & Rigg, Northw. Fl. 186 (1912); Piper & Beattie, Fl. Se. Wash. and Adj. Ida. 121 (1914); Clements & Clements, Rky. Mt. Fls. 25 (1914); Wooton & Standley in Contrib. U. S. Nat. Herb. **19**: 270 (1915); Rydb., Fl. Rky. Mts. Adj. Pl. 330 (1917); Payson in Ann. Mo. Bot. Gard. **5**: 143 (1918); Tidestrom in Contrib. U. S. Nat. Herb. **25**: 233 (1925); Rydb., Fl. Pr. Pl. Centr. N. Am. 362 (1932); Munz, Man. So. Calif. Bot. 197 (1935); St. John, Fl. Se. Wash. Adj. Ida. 175 (1937). *Coulterina* O. Kuntze, Revis. Gen. **2**: 931 (1891). *Vesicaria*, sect. *Physaria* Nutt. ex Torr. & Gray, Fl. N. Am. **1**: 102. (1838). Type species: *P. didymocarpa* (Hook.) Gray.

[1] Ann. Mo. Bot. Gard. **5**: 143–147 (1918).

Artificial Key to the Species

a. Style less than 3.5 mm. long (usually 1–2 mm.); replum lanceolate; basal sinus absent....*b.*
b. Valves of silique slightly inflated, flattened contrary to replum, not keeled; apical sinus and sinus-shoulders rounded.....1. *P. oregona.*
b. Valves of silique highly inflated, strongly keeled on margins; apical sinus and sinus-shoulders acute.....4. *P. Newberryi.*
a. Style more than 4 mm. long; replum various, but lanceolate only in *P. alpestris;* basal sinus present or absent....*c.*
c. Apical sinus of silique shallow (less than 1 mm.); apical angle of replum acute (except in *P. Geyeri* var. *purpurea*)....*d.*
d. Silique slightly inflated, cordate in outline, less than 1 cm. wide; ovules 2 in each loculus (sometimes 3 in var. *purpurea*).....2. *P. Geyeri.*
d. Silique highly inflated, orbicular in outline, more than 1 cm. wide; replum lanceolate; ovules about 4 in each loculus.....3. *P. alpestris.*
c. Apical sinus of silique deep (more than 2 mm.); apical angle of replum obtuse....*e.*
e. Replum obovate; ovules 4 in each loculus of silique....*f.*
f. Basal leaves 5–15 mm. long; plants densely tufted; stems less than 1 cm. long.....7. *P. condensata.*
f. Basal leaves 15–40 mm. long; plants loosely tufted; stems about 1 dm. long.....6. *P. didymocarpa.*
e. Replum narrowly oblong to linear-oblong (broader in *P. acutifolia* but there are only two ovules in each loculus in this species); ovules 2–6 in each loculus of silique....*g.*
g. Sinuses of silique equal above and below; valves nearly orbicular.....8. *P. australis.*
g. Sinuses of silique unequal (upper very deep, lower shallow or absent); valves variously shaped but not orbicular....*h.*
h. Silique highly inflated, 1.5–3 cm. wide; valves membranaceous.....5. *P. Chambersii.*
h. Silique moderately inflated, less than 1.5 cm. wide; valves coriaceous....*i.*
i. Plants loosely pubescent (almost lanate); cauline leaves dentate.....9. *P. Grahamii.*
i. Plants closely appressed-pubescent; cauline leaves entire....*j.*
j. Basal leaves rounded at apex; apical sinus of silique broad and deep (equaling replum-length in width and depth)....*k.*
k. Silique cordate, acute at base; basal leaves large (about 2 cm. broad).....10. *P. brassicoides.*
k. Siliques rectangular in outline, obtuse or truncate at base; basal leaves smaller (about 1 cm. broad).....11. *P. vitulifera.*
j. Basal leaves acute at apex; apical sinus of silique shallow or narrow and deep....*l.*
l. Apical sinus of silique narrow (less than 1 mm.) and deep (equaling replum-length); basal sinus absent; siliques pendant, loosely stellate.....12. *P. Osterhoutii.*
l. Apical sinus of silique broad (more than 2 mm.); basal sinus usually present but very

shallow; siliques erect or pendant, appressed-pubescent . . . . *m.*

m. Basal leaves entire or with a single broad tooth on each side, linear-oblanceolate, less than 4 cm. long; replum narrowly obovate . . . . . 13. *P. acutifolia.*

m. Basal leaves divided, broadly oblanceolate, more than 4 cm. long; replum linear, constricted . . . . . 14. *P. floribunda.*

1. P. OREGONA Watson. Perennial, caespitose, silvery stellate-pubescent throughout; caudex simple; stems several to numerous, erect or somewhat decumbent, simple, 1–3.5 dm. long including the fruiting raceme; basal leaves obovate, slender-petioled, usually incised or with a few broad teeth along the petiole, 4–6 cm. long, 8–15 mm. broad; cauline oblanceolate or broader, entire or sparsely dentate, acute, 1.5–2.5 cm. long, 3–5 mm. wide; sepals pubescent, oblong, 5–7 mm. long, about 1 mm. wide; petals lemon-yellow, spatulate, 9–12 mm. long, 2–3 mm. wide; fruiting pedicels spreading, curved upward, 1–2 cm. long; fruiting raceme 5–15 cm. long; siliques didymous, loosely pubescent with spreading stellae, inflated but not exceedingly so, flattened laterally, obreniform, 1.8–2.5 cm. broad, 10–12 mm. long; apical sinus broad and open, basal sinus lacking; replum broadly lanceolate, acute at apex, 6–8 mm. long, 2–3 mm. wide; style 1–2 mm. long; ovules 4 on each side of replum; seeds orbicular, brown, 2–3 mm. broad, 2–3 in each loculus, marginless.—Proc. Am. Acad. Arts & Sci. **17**: 363 (1882); Robinson in Gray, Syn. Fl. **1**: 121 (1895); Howell, Fl. Northw. Am. **1**: 52 (1897); Frye & Rigg, Northw. Fl. 186 (1912); Payson in Ann. Mo. Bot. Gard. **5**: 146 (1918); St. John, Fl. Se. Wash. Adj. Ida. 175 (1937). *Coulterina oregona* O. Kuntze, Revis. Gen. **2**: 931 (1891).—Western Idaho and eastern Oregon. IDAHO: Sheep Creek, Snake River Canyon, Idaho Co., April, 1935, *Constance & Rollins 1029* (NY); May, 1937, *Constance, Hedrick & Peters 1822* (G, R). OREGON: Pine Creek, Baker Co., June 23, 1880, *Cusick* (G TYPE, US ISOTYPE); April, 1881, *Cusick* (G); 1886, *Cusick* (G, US); hillsides near Snake River, May 25, 1898, *Cusick 1895* (G, US); near Imnaha, Wallowa Co., July, 1933, *Peck 17500* (NY); Cache Creek, Wallowa Co., May, 1897, *Sheldon 8183* (G, NY, US).

The outstanding distinctive characteristics of *P. oregona* are found in the silique, which is flattened contrary to the replum and only slightly inflated laterally. In these respects the species is similar to *P. Geyeri* and differs from other members of the genus. The larger silique and shorter style easily differentiate it from the latter species. *P. oregona* is an endemic of the Snake River Canyon region of Oregon and Idaho and is of interest because of its restriction to this unique area.[1]

[1] See Constance & Rollins, Proc. Biol Soc. Wash. **49**: 147 (1936).

2. P. Geyeri (Hook.) Gray, var. **typica.** Perennial, caespitose, silvery stellate-pubescent throughout; caudex usually simple; stems numerous, decumbent, simple, arising laterally, 1–3 dm. long including the fruiting raceme; basal leaves numerous, obovate, slender-petioled, entire or rarely with a few broad teeth along the petiole, 3–7 cm. long, 8–12 mm. broad; cauline entire, oblanceolate, 1.5–3 cm. long, 3–5 mm. wide; sepals oblong, pubescent with spreading stellae, 5–7 mm. long, 1–2 mm. wide; petals yellow, spatulate, 8–12 mm. long, 3–4 mm. wide; pedicels spreading, slightly curved upward or sigmoid, 1–2 cm. long; siliques didymous, inflated but not exceedingly so, obcordate, apical sinus broad and open, basal sinus absent, loosely pubescent with spreading stellae, flattened laterally, 6–9 mm. broad, 5–7 mm. long; replum ovate, apical angle acute, 4–6 mm. long, 2–3 mm. broad; style 5–7 mm. long; ovules 2 in each loculus; seeds brown, marginless, 1 or 2 in each loculus, about 2 mm. broad.—*P. Geyeri* (Hook.) Gray, Gen. Illustr. **1**: 162 (1848); Robinson in Gray, Syn. Fl. **1**: 121 (1895); Howell, Fl. Northw. Am. **1**: 52 (1897); Frye & Rigg, Northw. Fl. 186 (1912); Piper & Beattie, Fl. Se. Wash. Adj. Ida. 122 (1914); Rydb., Fl. Rky. Mts. Adj. Pl. 331 (1917) in part; Payson in Ann. Mo. Bot. Gard. **5**: 146 (1918); St. John, Fl. Se. Wash. Adj. Ida. 175 (1937). *Vesicaria Geyeri* Hook., Lond. Journ. Bot. **6**: 70 (1847). *Coultcrina Geyeri* O. Kuntze, Revis. Gen. **2**: 931 (1891).—Eastern Washington to western Montana. Montana: Jefferson Co., July, 1892, *F. D. Kelsey* (NY); Deer Lodge Valley, June, 1906, *M. E. Jones* (US); Madison Co., June, 1888, *F. Tweedy* (NY); Miller Creek, Missoula Co., May, 1926, *Kirkwood 2414* (G). Idaho: shore of Lake Coeur d'Alene, Kootenai Co., July, 1895, *Leiberg 1314* (G, NY). Washington: Spokane Valley, *Geyer 476* (G isotype); Spokane River, Spokane Co., May, 1937, *Constance 1834* (G, R); June 1893, *Henderson 2384* (G); May, 1924, *St. John 7632* (G, NY); May, 1896, *Piper 2293* (G, NY); Hangman Cr., Spokane Co., May, 1893, *Sandberg & Leiberg 17* (G, NY); between Spokane River and Colville, Wilkes U. S. Explor. Exp. *435* (NY); Davenport, Lincoln Co., May 20, 1905, *M. E. Jones* (US).

The specific nature of this entity has not been questioned since its original publication by Hooker. As pointed out above, its natural relative is *P. oregona* from which it is amply distinct. *P. Geyeri* has a restricted geographical range and is apparently common in the Spokane Valley of eastern Washington where it was first discovered.

Var. **purpurea**, var. nov. Petals purple; apical angle of replum obtuse; ovules often 3 in each loculus of the silique.—Planta perennis; petalis purpureis; replo obovato basi apicique obtuso; loculis circa 3-ovulatis.—Idaho: Bonanza, Custer Co., July 25, 1916, *Macbride & Payson 3448* (G type, NY isotype); Challis Creek, Custer Co., July 1916, *Macbride & Payson 3342* (G, NY).

3. P. alpestris Suksdorf. Perennial, caespitose, silvery stellate-pu-

bescent throughout; caudex simple or rarely branched, stems several, simple, arising laterally, erect or somewhat decumbent, 5–15 cm. long including fruiting raceme; basal leaves numerous, entire, obovate, rarely acutish, tapering abruptly to a slender petiole, 3–5 cm. long, 1–2 cm. broad; cauline oblanceolate, few, 5–15 mm. long, 3–5 mm. broad; inflorescence subcorymbose; sepals oblong, pubescent, 8–10 mm. long, 1.5–2 mm. broad; petals yellow, spatulate, undifferentiated into blade and claw, 12–14 mm. long, 2–3 mm. broad; ovary incrusted with stellae; fruiting pedicels divaricate, straight, 5–10 mm. long; siliques didymous, highly inflated, with a shallow open sinus above, slightly notched below, evenly pubescent; valves subreniform, 1–1.5 cm. long, 7–10 mm. wide; replum lanceolate, acutely angled at apex, 7–10 mm. long, 1.5–2.5 mm. broad; style 5–7 mm. long; ovules 4–5 in each loculus; seeds brown, suborbicular, flattened, 2–3 mm. broad, 1–3 in each loculus.—West Am. Sci. **15**: 58 (1906); Payson in Ann. Mo. Bot. Gard. **5**: 147 (1918); G. N. Jones in Univ. Wash. Publ. **7**: 91 (1938). *P. didymocarpa* Howell, Fl. Northw. Am. **1**: 52 (1897) in part; Frye & Rigg, Northw. Fl. 186 (1912).—West-central Washington. WASHINGTON: locality uncertain, Wilkes U. S. Expl. Exp. *888* (NY, US); Mt. Stuart region, Chelan Co., Aug., 1930, *Thompson 5813* (G); Tronson Ridge, Chelan Co., June, 1932, *Thompson 8595* (G, NY); June, 1933, *Thompson 8966* (G, NY); Three Brothers, Chelan Co., June, 1934, *Thompson 10540* (NY); Beverly Creek, Kittitas Co., July, 1932, *Thompson 8708* (G, NY); near Liberty, Kittitas Co., June, 1935, *Thompson 11578* (G, NY); Mount Paddo (Adams), July 12, Sept. 2, 1900, *Suksdorf 2648* (G, NY isotypes); Aug. 30, 1904 and July 27, 1906, *Suksdorf 4137* (G).

P. alpestris has been critically discussed elsewhere. It stands well apart as a species both on morphological and geographical grounds. The nearest relative from a technical standpoint appears to be *P. oregona*, but the species is also related to *P. Chambersii* on account of the large highly inflated fruits and orbicular entire basal leaves. However, the replums of the two are decidedly different and it seems probable that their ancestry was entirely different.

4. P. NEWBERRYI Gray. Perennial, caespitose, silvery-stellate throughout; caudex simple or branched; stems several to numerous, erect, simple, arising laterally, 0.5–1 dm. long including the fruiting raceme; basal leaves obovate, incised or merely dentate with broad teeth, slender-petioled, 4–8 cm. long, 1.5–2.5 cm. broad; cauline few, entire, oblanceolate, 1–2 cm. long, 3–4 mm. wide; sepals linear-oblong, pubescent, 7–9 mm. long, about 1 mm. wide; petals yellow, ligulate, often truncate at apex, 10–13 mm. long, 2–3 mm. wide; fruiting raceme dense, 3–5 cm. long; pedicels rigid, straight, divaricate, 5–10 mm. long; siliques didymous, highly inflated, apical sinus broad the shoulders angular, evenly covered with appressed stellae; valves

keeled on both outer margins, each valve 8–12 mm. wide, 12–16 mm. long; replum linear, acute at apex, 8–10 mm. long, 1–1.5 mm. wide; style 2–3 mm. long; ovules 2–4 in each loculus; seeds obovate, light brown, marginless, 2–3 mm. wide, 3–4 mm. long.—Ives' Report Colo. River, pt. 4. 6 (1860); Robinson in Gray, Syn. Fl. **1:** 121(1895) in part; Coulter & Nelson, Man. Cent. Rky. Mts. 218 (1909) in part; Wooton & Standley in Contrib. U. S. Nat. Herb. **19.** 270 (1915); Rydb., Fl. Rky. Mts. Adj. Plains 331 (1917) in part; Payson in Ann. Mo. Bot. Gard. **5:** 146 (1918). *P. didymocarpa* var. *Newberryi* Jones in Proc. Calif. Acad. Sci. **2:** 5. 624 (1895) in part. *Coulterina Newberryi* O. Kuntze, Revis. Gen. **2:** 931 (1891).—New Mexico to northern Arizona. NEW MEXICO: locality uncertain, western New Mexico, May, 1869, *E. Palmer* (G, NY, US); near Tegua, May 14, 1858, *J. S. Newberry* (G TYPE, NY, US ISOTYPES); Fort Wingate, 1882 & 1883, *W. Mathews* (G); May 27, 1883, *C. D. Walcott 43* (US); Gallup, June 14, 1916, *Eastwood 5595* (G, US). ARIZONA: Cave Dwellers Mt., east of Mt. Agassiz, Aug., 1884, *Lemmon 3356* (G); Sunset Peak, Flagstaff, June, 1928, *Osterhout 7000* (RM); July, 1923, *H. C. Hansen 620* (RM); July, 1937, *R. E. Collom 746* (US); May–Oct., 1900, *Purpus 7075* (US); July, 1901, *Leiberg 5699* (US); 15 miles no. of Granado, Apache Co., June, 1937, *Peebles & Smith 13478* (US); San Francisco Mts., June, 1887, *E. A. Mearns* (NY); near Flagstaff, June, 1891, *McDougal 154* (US).

Physaria Newberryi is one of the most distinctive species of the genus and it is, therefore, difficult to understand why confusion over its relationship to other members has been so general. It would seem from the identifications on many specimens that any plant with highly inflated siliques, regardless of other characteristics, has been considered to be good *P. Newberryi.* Actually the V-shaped apical sinus, short style and straight-sided siliques are distinctive characteristics which well define this species.

5. P. **Chambersii,** sp. nov. Herba perennis caespitosa undique indumento argenteo-stellato tecta; caulibus decumbentibus vel erectis 5–15 cm. longis; foliis radicalibus obovatis vel rotundatis integris vel dentatis 3–6 cm. longis, 1–2 cm. latis; foliis caulinis integris spathulatis acutis 1–2 cm. longis, 3–6 mm. latis; inflorescentiis laxis; sepalis lineari-oblongis 6–8 mm. longis, 1 mm. latis; petalis flavis spathulatis 10–12 mm. longis, 3–4 mm. latis; pedicellis fructiferis divaricatis 8–15 mm. longis; siliquis didymis inflatis pubescentibus; loculis subreniformibus 1–1.5 cm. longis, ca. 1 cm. latis; replo oblongo 4–6 mm. longo, 1 mm. lato; stylo 6–8 mm. longo; loculis di- vel hexispermis; seminibus exalatis.

Perennial, caespitose, silvery stellate throughout; stems numerous from a simple caudex, arising laterally, erect or very often decumbent, simple, 5–15 cm. long including the fruiting raceme; radical leaves

entire or dentate, obovate to orbicular, slender-petioled, 3–6 cm. long, 1–2 cm. broad; cauline few, entire, spatulate, often acute, 1–2 cm. long, 3–6 mm. wide; inflorescence rather lax; sepals linear-oblong, pubescent, 6–8 mm. long, 1 mm. wide; petals yellow, spatulate, 10–12 mm. long, 3–4 mm. wide; fruiting raceme congested, 2–10 cm. long; pedicels divaricate, slightly sigmoid, 8–15 mm. long; siliques didymous, greatly inflated, evenly and often densely pubescent, often purplish at maturity, obtuse to slightly cordate at base; apical sinus deep and open, crests rounded; valves subreniform, each valve 1–1.5 cm. long, about 1 cm. wide; replum oblong, obtuse at apex, 4–6 mm. long, 1 mm. wide; style 6–8 mm. long; ovules 2–6 (mostly 4) on each side of the replum; seeds orbicular, flattened, brown, 2–3 mm. broad, 2–4 in each loculus, marginless.—*P. didymocarpa* Howell, Fl. Northw. Am. **1**: 52 (1897) in part. *P. Newberryi* Rydb., Fl. Rky. Mts. Adj. Pl. 331 (1917) in part; Tidestrom in Contrib. U. S. Nat. Herb. **25**: 233 (1925) in part; Munz, Man. So. Calif. Bot. 198 (1935).—Utah and Nevada. UTAH: Pahvant Butte, Millard Co?, May, 1925, *A. J. Harris C2518* (G); southern Utah, 1877, *E. Palmer 34* (NY, US); Thistle Junction, June, 1900, *S. G. Stokes* (NY, US); Cedar City, May, 1894, *M. E. Jones 5202* (NY, US); Marysvale, June, 1894, *M. E. Jones 5397c* (NY, US); Ephraim, San Pete Co., May, 1914, *Eggleston 10111* (US); Mt. Nebo, Juab Co., Aug., 1905, *Rydberg & Carleton 7701* (NY); Parley's Canyon, Salt Lake Co., June, 1923, *Garrett 3031* (G). NEVADA: Clover Mts., July, 1893, *E. L. Greene* (NY); Santa Rosa Mts., Humboldt Co., July, 1898, *Cusick 2025* (G, US); Lamoille Canyon, Ruby Mts., Elko Co., July, 1938, *Rollins & Chambers 2568* (G, R); Aug., 1908, *Heller 9378* (NY, US); 36 mi. w. of Wendover, Elko Co., June, 1934, *Maguire 5808* (G); 20 mi. sw. of Jiggs, Eureka Co., July, 1938, *Rollins & Chambers 2543* (G, R); mountain slopes of Jet Canyon, 15 mi. west of Round Mountain, Toiyabe Mts., Nye Co., July, 1938, *Rollins & Chambers 2502* (G TYPE, R ISOTYPE); Bunker Hill, Toiyabe Forest, July, 1913, *A. E. Hitchcock 860* (US); Trail Canyon, White Mts., Esmeralda Co., July, 1932, *Duran 3349* (G, NY); Mt. Gabb, Palmetto Range, 1898, *Purpus 5863* (US); Karshaw, Lincoln Co., May, 1902, *Goodding 973* (G, NY); Kyle Canyon, Charleston Mts., July, 1936, *Clokey 7102* (R, Cl); Clark Canyon, Charleston Mts., May, 1936, *Clokey & Anderson 7099* (R, Cl); Cold Cr., Charleston Mts., June, 1938, *Clokey 7946* (Cl). OREGON: Sheaville, Malheur Co., June, *Percy Train* (US) (This is a flowering specimen which is provisionally placed here. Certainly it is not *P. oregona* Wats. as determined by the collector).

Physaria Chambersii is somewhat related to *P. Newberryi* and has been confused with it by several botanists. The technical characters of the two species show that the relationship is not a particularly close one. Both have a broad open sinus at the base of the style and the siliques are large and highly inflated, but here similarity of silique-

characteristics cease. The siliques of *P. Newberryi* have keeled apical margins, truncate base, sinus-crests decidedly angular, style 2–3 mm. long, replum 8–10 mm. long with acute apex and straight-sided valves, whereas in *P. Chambersii* the siliques have rounded sides and apical margins, cordate or nearly truncate base, sinus-crests rounded, style 8–13 mm. long and replum 3–6 mm. long with an obtuse apex. Actually, *P. Chambersii* has a closer relative in *P. australis*. The latter has much smaller coriaceous siliques with closed sinuses of equal depth, whereas *P. Chambersii* has large chartaceous siliques with a deep open apical sinus and a basal sinus which is very shallow or entirely absent. The two species occupy different geographical areas as well.

Variation in the number of ovules in different collections of *P. Chambersii* is puzzling. The ovule-number is consistent for any given collection, but accompanying significant morphological changes apparently have not taken place. Thus, it is possible to find among the collections which are considered to belong to this species a number which have only two ovules in each loculus, a number with four and a few with six. I have not found any variation in number in different siliques from the same plant nor from different plants of the same collection. It would seem from this that a reduction in ovule-number may be independent of other changes in the plant and having once occurred it tends to become fixed or constant. If this is of survival value to the plant, it might be reasonably supposed to be of importance in the origin of new biologically natural entities in the genus.

Var. **membranacea**, var. nov. Herba perennis caespitosa; foliis radicalibus oblanceolatis integris acutis; foliis caulinis integris linearibus oblanceolatis acutis; loculis subreniformibus 1–2 cm. longis, 1–1.5 cm. latis; replo lineari 3–4 mm. longo, 1 mm. lato; stylo persistente 8–12 mm. longo; loculis dispermis.

Caespitose perennial; radical leaves oblanceolate, acute, entire, slender-petioled; cauline entire, linear-oblanceolate, acute; siliques membranaceous, highly inflated, light yellowish, with a deep open sinus above, cordate below, evenly pubescent with appressed stellae; valves subreniform; replum linear, obtuse at apex, 3–4 mm. long, 1 mm. wide; ovules 2 in each loculus.—UTAH: Red Canyon, 16 miles west of Bryce Canyon National Park, Garfield Co., July 6, 1938, *Reed C. Rollins & T. S. Chambers 2448* (G TYPE, R ISOTYPE); Bryce Canyon, Garfield Co., July, 1930, *Goodman & Hitchcock 1567* (NY).

6. P. DIDYMOCARPA (Hook.) Gray. Perennial, caespitose, silvery-stellate throughout, stellae branched or simple, often stalked; stems numerous, simple, decumbent, rather leafy for the genus, about 1 dm.

high; radical leaves numerous, obovate, repand or dentate, rarely entire, usually with an angular apex, long-petioled, 1.5–4 cm. long, 8–16 mm. wide; cauline oblanceolate, acute, entire or with an occasional tooth, 1–2 cm. long, 4–8 mm. wide; inflorescence congested, elongating in fruit; sepals pubescent, 6–8 mm. long, 1.5–2 mm. wide, often keeled; petals yellow, spatulate, 10–12 mm. long, 3–4 mm. wide; pedicels spreading, straight or very slightly curved, 8–12 mm. long; siliques didymous, inflated, erect, with deep narrow usually closed apical sinus and similar basal sinus, loosely pubescent with spreading stellae; valves 8–12 mm. long, 6–8 mm. wide; replum obovate to broadly oblong, not constricted, obtuse at apex, 3–4 mm. long, 2–3 mm. broad; style 7–9 mm. long; ovules 4 on each side of replum; seeds marginless, brown, about 2.5 mm. broad, 2–3 in each loculus.

Basal leaves entire, rounded; siliques appressed-pubescent. . Var. *integrifolia*.
Basal leaves dentate or angular; siliques with a dense spreading pubescence.
Basal leaf-bases lanate, pubescence spreading throughout. . . . . Var. *lanata*.
Basal leaf-bases not lanate, pubescence appressed except on the siliques. . . . . Var. *normalis*.

Var. NORMALIS O. Kuntze, Revis. Gen. **1**: 35 (1891). *P. didymocarpa* Gray, Gen. Illustr. **1**: 162 (1848); Coulter, Man. Rky. Mt. Reg. 26 (1885) in part; Britt. & Brown, Ill. Fl. **2**: 135 (1897) in part and ed. 2. **2**: 156 (1913) in part; Coulter & Nelson, Man. Cent. Rky. Mts. 217 (1909) in part; Rydb. Fl. Rky. Mts. Adj. Pl. 330 (1917) in part; Payson in Ann. Mo. Bot. Gard. **5**: 144 (1918); Rydb., Fl. Pr. Pl. Cent. N. Am. 262 (1933) in part. *Vesicaria didymocarpa* Hook., Fl. Bor.-Am. **1**: 49 (1830). *Coulterina didymocarpa* O. Kuntze, Revis. Gen. **2**: 931 (1891). *P. macrantha* Blankinship in Mont. Agric. Coll. Sci. Stud. **1**, pt. 2: 60 (1905).—Northern Alberta to Wyoming. CANADA: locality uncertain, Rky. Mts., 1858, *Bourgeau* (G, NY); Franklin's Journey (NY). ALBERTA: Kootenay Plains, June, 1908, *S. Brown 970* (G, NY); jct. north fork and n. branch Saskatchewan R., June, 1908, *S. Brown 917* (G); Banff, July, 1907, *Butters & Holway 41* (G, NY); June, 1906, *S. Brown 123* (G); Bow River Pass, Sept., 1879, *Macoun 89* (G); Morley, June, 1885, *Macoun* (G, NY); Rky. Mt. Nat. Park, July, 1897, *Van Brunt 70* (NY); July, 1904, *John Macoun 64432* (G, NY). MONTANA: Little Belt Mts., Aug., 1896, *Flodman 596* (NY); Belt Mts., July, 1886, *F. W. Anderson 411* (NY); Cedar Mt., July, 1897, *Rydberg & Bessey 4168* (NY); Lima, June, 1895, *Shear 3406* (NY); Livingston, 1901, *Scheuber 363* (NY); near Indian Cr., July, 1897, *Rydberg & Bessey 4166* (NY); Bozeman, May, 1901, *E. J. Moore* (G); Midvale, July, 1903, *Umbach 305* (G); Granite Butte, Sept., 1912, *Owen Byrnes 127* (G, isotype of *P. macrantha* Blankin.); Bridger Mts., June, 1897, *Rydberg & Bessey 4167* (G). WYOMING: Glen Cr., Y. N. Park, June, 1899, *A. & E. Nelson 5570* (G, NY); near Mammoth Hot Spgs., July, 1893, *Burglehaus 6318* (NY); Mt. Leidy, Aug., 1897, *Tweedy 391*

(NY); Medicine Mt., Big Horn Co., July, 1936, *L. & R. Williams 3228* (G, NY).

Plants of *P. didymocarpa* are remarkably uniform from the northernmost portion of its range, extending as far south as northern Wyoming, but specimens from west-central Wyoming show certain transitional stages toward its southern analogue, *P. australis*. These plants, while possessing a broad replum and four ovules in each loculus of the ovary, have appressed stellae on the siliques and entire obtuse basal leaves. The whole series is rather obviously a single line and the segregation of *P. australis* as a distinct entity must have been a comparatively recent evolutionary development. Two varieties of *P. didymocarpa* are recognized in the present treatment and apparently represent two lines of divergence from the parent species. Both have distinctive geographical areas which border the southern margin of the range of variety *normalis*.

Var. LANATA A. Nelson in Bull. Torr. Bot. Club **31**: 241. (1904); Coulter and Nelson Man. Cent. Rky. Mts. 217. (1909); Payson in Ann. Mo. Bot. Gard. **5**: 145 (1918). *P. lanata* Rydb. in Bull. Torr. Bot. Club **39**: 322 (1912); Rydb., Fl. Rky. Mts. Adj. Plains 330. (1917).—Central Wyoming. WYOMING: Head of middle fork of Powder River, Big Horn Co., July, 1901, *Goodding 326* (G, NY ISOTYPES); Wallace Creek, Natrona Co., July, 1894, *A. Nelson 674* (G); foothills Sheridan-Buffalo, June–July, 1900, *Tweedy 3585* (NY).

Var. **integrifolia**, var. nov., caespitosa incana; foliis radicalibus integris obovatis; siliquis pubescentibus adpressis.—West-central Wyoming. WYOMING: Grand Canyon of Snake River, Lincoln Co., July 8, 1932, *L. Williams 809* (G TYPE, NY ISOTYPE); hills east of Afton, Lincoln Co., June, 1923, *Payson & Armstrong 3825* (G); Adams Ranch, Jacksons Hole, July, 1901, *Merrill & Wilcox 965* (G); Gros Ventre River, Aug., 1894, *A. Nelson 927* (G); Headwaters Cliff Creek, Aug., 1900, *C. C. Curtis* (NY).

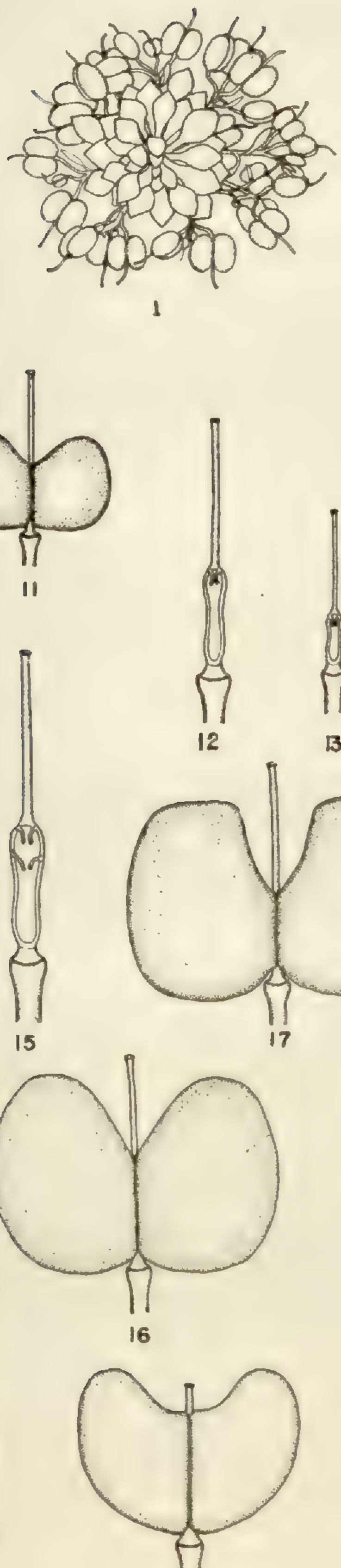
7. P. **condensata**, sp. nov. Herba perennis caespitosa argentea stellato-pubescentia; caulibus simplicibus brevibus 0.5–1 cm. altis; foliis radicalibus numerosissimis integris obovatis 0.5–1.5 cm. longis, 4–8 mm. latis; foliis caulinis paucis oblanceolatis 5–10 mm. longis, 2–3 mm. latis; pedicellis fructiferis divaricatis rigidis 5–10 mm. longis; siliquis inflatis didymis pubescentibus apice basique cordatis; loculis subsphaeroideis 4–8 mm. diametro; replo obovato 3–4 mm. longo, 2–3 mm. lato; stylo persistente 4–6 mm. longo; seminibus suborbicularibus exalatis 2 mm. diametro; cotyledonibus accumbentibus.

Perennial, caespitose, silvery-stellate throughout; caudex simple or rarely branched, greatly enlarged and invested with old leaf-bases; stems several to many, arising laterally from the caudex beneath a dense rosette of leaves, stellate-pubescent, less than 1 cm. long; basal

leaves entire, obovate, tapering abruptly to a narrow petiole, silvery from a dense incrustation of appressed stellae, usually acute, 0.5–1.5 cm. long, 4–8 mm. broad; cauline leaves few, oblanceolate, entire, densely stellate, 5–10 mm. long, 2–3 mm. broad; fruiting raceme congested, subumbellate, often almost sessile; pedicels divaricate, straight, 5–10 mm. long; siliques inflated, didymous with a deep sinus at apex and base, pubescent with loosely spreading stellae, inner surface glabrous, loculi 4–8 mm. in diameter; replum obovate, 3–4 mm. long, 2–3 mm. wide; style 4–6 mm. long; ovules 4 in each loculus, 1 or 2 abortive; seeds brown, orbicular, flattened, marginless, 2–4 in each loculus, about 2 mm. in diameter; cotyledons accumbent; flowers unknown.—WYOMING: limy knoll-crest, foothills of Bridger Butte, 3 miles west of Fort Bridger, Uinta County, June 24, 1938, *Reed C. Rollins 2385* (G TYPE, R ISOTYPE).

Physaria condensata is analogous in growth-form to *Lesquerella condensata* A. Nelson, by which the specific name is suggested. Both species inhabit unprotected knoll-crests in the Upper Sonoran Life-Zone of southwestern Wyoming, though the latter has a much wider geographic range. *P. condensata*, as shown by its technical characters, is most closely related to *P. didymocarpa*. However, the two species differ so strikingly in growth-habit that they could scarcely be confused either in the field or laboratory. *P. condensata* possesses a dense flat rosette of entire leaves which terminates each sobole or the single caudex, resembling in a general way certain flat-leaved species of *Sedum*. The stems are less than a centimeter long and the whole plant is condensed into a tuft less than five centimeters across. The plant in its normal habitat barely projects above the ground-surface. This is strikingly contrasted wit the loose habit of growth, well-developed stems and dentate leaves of *P. didymocarpa*.

8. P. **australis** (Payson), comb. nov. Perennial, caespitose, silvery-stellate throughout, stellae many rayed, rays forked; stems numerous, usually somewhat decumbent, simple, arising laterally, 5–15 cm. long including the fruiting raceme; basal leaves numerous, entire or very rarely with a few scattered teeth, 2–8 cm. long, 5–30 mm. broad, blade obovate to orbicular, obtuse; petiole slender, often narrowly winged; cauline entire, spatulate to oblanceolate, usually obtuse, 1–3 cm. long, 3–8 mm. wide; inflorescence racemose, elongating in fruit; sepals linear-oblong, pubescent; petals spatulate, yellow, about 1 cm. long; pedicels divaricate, slightly sigmoid or nearly straight, 6–12 mm. long; siliques erect, didymous, inflated, pubescent, apical sinus deep, narrow and closed or nearly so, basal sinus similar to apical; valves suborbicular, 6–10 mm. high, 3–6 mm. wide; replum oblong, constricted, 2–3 mm. long; ovules 2 in each loculus; style 4–6 mm.



PHYSARIA

For explanation see end of paper, p. 415.

long; seeds brown, suborbicular, wingless, 2–3 mm. broad.—*P. didymocarpa* (Hook.) Gray var. *australis* Payson in Ann. Mo. Bot. Gard. **5**. 144 (1918); E. H. Graham in Ann. Carneg. Mus. **26**. 220 (1937). *P. didymocarpa* Torr. in Stansbury Expl. & Surv. Great Salt Lake App. D. 284 (1852); Rydb., Fl. Colo. 154 (1906) in part; Coulter & Nelson, Manual Cent. Rky. Mts. 217 (1909) in part; Rydb., Fl. Rky. Mts. Adj. Pl. 330 (1917) in part; Tidestrom in Contrib. U. S. Nat. Herb. **25**: 233 (1925).—Idaho and Wyoming to New Mexico and Utah. IDAHO: Soda Springs, Bannock Co., June, 1920, *E. B. & L. B. Payson 1701* (G, NY). WYOMING: Sand Creek, Albany Co., June, 1900, *Nelson 7026* (G, NY); Camel Rock, Albany Co., June 21, 19 ?, *Schwartz & Garner 51* (G); Dyer's Ranch, Carbon Co., June, 1901, *Goodding 80* (G); Fort Steele, Carbon Co., May–June, 1901, *Tweedy 4488* (NY); Bad Water, Fremont Co., June, 1910, *A. Nelson 19403* (G); Green River, Sweetwater Co., June, 1895, *Shear 4364* (US), June, 1938, *Rollins 2241* (G, R); Blacks Fork River, Uinta Co., June, 1937, *Rollins 1653* (G, NY, R); 3 mi. w. Fort Bridger, Uinta Co., May, 1938, *Rollins 2229* (G, R); June, 1938, *Rollins 2387* (G, R); 20 mi. west Big Piney, Lincoln Co., July, 1922, *E. B. & L. B. Payson 2618* (G, NY). COLORADO: Naturita, Montrose Co., April, 1914, *Payson 247* (G); Norwood Hill, San Miguel Co., Aug., 1912, *Walker 490* (G); Paradox, Montrose Co., June, 1912, *Walker 89* (G, US); Hills about Dolores, June, 1892, *C. S. Crandall* (G); 10 mi. so. Montrose, Montrose Co., May, 1938, *Rollins 2134* (G); 8 mi. w. Grand Junction, Mesa Co., May, 1938, *Rollins 2176* (G, R); 20 mi. no. Rifle, Rio Blanco Co., May, 1938, *Rollins 2209* (G, R); dry hills near Meeker, Rio Blanco Co., May, 1938, *Rollins 2220* (G, R); Durango, June, 1898, *Crandall* (NY); Mancos, June, 1898, *Baker, Earle & Tracy 75* (G, US); Mesa Verde Park, May, 1925, *A. Nelson 10425* (NY). NEW MEXICO: Aztec, April, 1899, *Baker 356* (G, NY, US); vicinity of Farmington, San Juan Co., July, 1911, *Standley 7129* (US). UTAH: Logan Canyon, Cache Co., April, 1911, *C. P. Smith 2331* (NY), May, 1934, *Bassett & Ruth Maguire 15956* (G); Wahsatch Mts., July, 1869, *S. Watson 83* (NY); Orangeville, June, 1894, *M. E. Jones 5464* (US); Price, June, 1900, *Stokes* (NY); Theodore, Uintah Co., May, 1908, *M. E. Jones* (NY); 47 mi. so. Moab, June, 1933, *B. Maguire et al. 5809* (US); Flaming Gorge, Daggett Co., May, 1932, *L. Williams 458* (G, NY); La Sal Mts., July, 1911, *Rydberg & Garrett 8573* (NY); June, 1913, *M. E. Jones* (NY); 4 mi. w. Willow Creek, Uintah Co., June, 1937, *Rollins 1708* (G, R).

A careful examination of numerous specimens of Payson's variety *australis* has revealed a number of fundamental characteristics which indicate its distinctness as a separate species from *P. didymocarpa*. Chief among these is a reduced number of ovules in each loculus of the ovary. In *P. didymocarpa* there are four[1] ovules in each of the two

[1] Figs 9 and 10, tab. XVI, Hook. Fl. Bor.-Am. must certainly be in error as to the number of ovules. I have examined the siliques of over thirty collections of this

loculi. Often one and sometimes two ovules abort, consequently only two or three seeds mature on each side of the replum. *P. australis* has only two ovules in each loculus and the funiculi are at the very apex of the replum. Usually one of the two ovules aborts, leaving only one which matures. Equally consistent but possibly less fundamental is the difference in the nature of the replum of these species. *P. australis* has a very narrowly linear constricted replum which is less than 1 mm. wide, whereas the replum of *P. didymocarpa* is oblong to obovate and 2–3 mm. wide. When these constant differences are added to those pointed out by Payson the specific nature of *P. australis* becomes apparent.

9. P. GRAHAMII Morton. Perennial, caespitose, densely pubescent throughout with spreading stellae; stems simple, somewhat decumbent, about 1.5 dm. long; basal leaves numerous, broadly oblanceolate to broadly spatulate, obtuse, irregularly pinnatifid, 10–15 cm. long, about 3 cm. broad, distal lobes large and variable; cauline few, dentate or rarely entire; pedicels divergent, 5–15 mm. long; sepals linear-oblong, pubescent, about 5 mm. long; petals yellow, spatulate, 6–8 mm. long; siliques erect, didymous, inflated but not highly so, shallow sinus below, deep sinus above; replum linear-oblong, somewhat constricted, ovules 2 on each side; style 6–8 mm. long; mature seeds unknown.—Morton in E. H. Graham in Ann. Carneg. Mus. **24**: 220 (1937).—UTAH: Chandler Canyon, Uinta Basin, Uintah County, Aug. 3, 1935, *Graham 9976* (US TYPE).

The type of this species is not altogether satisfactory because the fruits are very immature. Its distinctiveness rests upon the fact that the whole plant is covered with very loose spreading stellae and that the large basal leaves are deeply lobed along the margins. *P. Grahamii* is at present known only from the type collection.

10. P. BRASSICOIDES Rydberg. Perennial, caespitose, silvery-stellate throughout, stellae with forked rays; stems several to numerous, rather stoutish for the genus, simple, arising laterally, 5–15 cm. long including the fruiting raceme; basal leaves numerous, thick, scurfy above, repand or rarely entire, 2–6 cm. long, 1–2.5 cm. broad, blade orbicular to obovate, petiole somewhat winged; cauline few, oblanceolate to broadly spatulate, obtuse or approaching acuteness, entire, 1–2 cm. long, 3–5 mm. wide; sepals linear-oblong, 6–8 mm. long, about 1 mm. wide; petals yellow, spatulate, about 1 cm. long, 3–4 mm. wide; pedicels divergent, straight or somewhat curved, 5–10 mm. long; si-

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species and consistently find four ovules on each side of the replum. The drawings are also in error as to the acute apex of the replum. This is characteristic of *P. Geyeri* and is probably taken from Douglas' plants which Hooker cited. The apical angle of the replum of *P. didymocarpa* is decidedly obtuse.

liques didymous, erect, cordate, inflated but not greatly so, loosely but densely pubescent with spreading stellae, obtuse or with an obscure sinus at base, apical sinus deep and broad, valves 6–8 mm. high; replum linear-oblong, constricted, 3–4 mm. long, about 1 mm. wide; ovules 2 in each loculus; style 4–5 mm. long; seeds brown, 2–3 mm. broad.—Bull. Torr. Bot. Club **29**: 237 (1902); Peterson, Fl. Neb. 62 (1912); Rydb., Fl. Rky. Mts. Adj. Pl. 331 (1917); Payson in Ann. Mo. Bot. Gard. **5**: 145 (1918); Rydb., Fl. Pr. Pl. Cent. N. Am. 362 (1932). *P. didymocarpa* Britt. & Brown, Ill. Fl. ed. 2. **2**: 156 (1913) in part; Bergman, Fl. N. Dak. 191 (1918); Winter in Contrib. Bot. Surv. Neb. n. s. **10**: 71 (1936).—NORTH DAKOTA: Medora, July 17, 1898, *L. R. Waldron* (NDA, NY); June 19, 1910, *H. F. Bergman* (NDA); Gorham, McKenzie Co., May, 1938, *E. C. Moran 399 & 400* (G). SOUTH DAKOTA: cultivated at Brookings from seed collected in badlands, *Th. A. Williams* (G). NEBRASKA: canyon south of Scott's Bluff, Scott's Bluff Co., July, 1891, *Rydberg 24* (NY TYPE, US ISOTYPE); badlands, 1853–4, *F. V. Hayden* (NY). WYOMING: 1 mi. northwest of Hulett, Crook Co., May, 1935, *Owenby 610* (NY, R).

An inhabitant of bluffs and badlands in the western plains region, *P. brassicoides* is one of the least known species of the genus *Physaria*. Its affinities are with *P. didymocarpa* var. *lanata* on the one hand and *P. vitulifera* on the other. The dense loose whitish vestiture of the siliques immediately suggests *P. didymocarpa* and its variety *lanata*, but the replum is constricted, the ovules number two in each cell and the base of the silique is almost devoid of a sinus like that of *P. vitulifera*. From the latter species it differs in having very much larger, almost entire thickish basal leaves, larger more highly inflated obpyriform siliques and a longer replum. Little difficulty should be experienced in placing specimens of this rather unique species.

11. P. VITULIFERA Rydberg. Perennial, caespitose, silvery stellate-pubescent throughout; stellae with numerous branched rays; stems numerous, usually decumbent, arising laterally, simple, rather coarse, 1–2 dm. long including fruiting raceme; basal leaves numerous, pandurate or merely obovate, obtuse, margins deeply and broadly incised or rarely almost entire, 3–6 cm. long, 1–2 cm. broad; cauline entire, oblanceolate to spatulate, often somewhat acute, 3–6 mm. broad; inflorescence congested, elongating in fruit; sepals oblong, pubescent, 6–8 mm. long, 1.5–2 mm. wide; petals yellow, spatulate, about 1 cm. long, 3–4 mm. wide; pedicels sigmoid, the end usually curving upward; siliques didymous, often rigid, inflated, somewhat angular, pubescent with loose spreading stellae, obtuse or truncate below, apical sinus broad, open and deep; valves 5–6 mm. high, 3–4 mm. broad; replum oblong, often constricted, 2–3 mm. long, less than 1 mm. wide, 2 ovules on each side; style 5–7 mm. long; seeds 1–2 in each loculus,

brown, about 2.5 mm. broad, wingless.—Bull. Torr. Bot. Club **28**: 278 (1901); Rydb., Fl. Colo. 154 (1906); Coulter & Nelson, Man. Cent. Rky. Mts. 218 (1909); Rydb., Fl. Rky. Mts. Adj. Pl. 330. (1917); Payson in Ann. Mo. Bot. Gard. **5**: 145 (1918). *P. didymocarpa* Clements & Clements, Rky. Mt. Fls. 25 (1914) in part. *P. didymocarpa* β *contractoreplum* O. Kuntze, Revis. Gen. Pl. **1**: 35 (1891).—COLORADO: without locality, Sept., 1874, *O. Kuntze 3058* (NY isotype of *P. didymocarpa* β *contractoreplum*); Idaho Springs, Aug., 1895, *Rydberg* (NY TYPE); June, 1916, *Clokey 2753* (NY); Aug., 1895, *Shear 3269* (NY, US); near Golden, June, 1918, *Churchill* (G); July, 1917, *E. L. Johnston 1019* (G); April, 1892, *Crandall 45* (NY, US); May, 1920, *Duthie & Clokey 3777* (Cl, G, NY, US); Morrison, Jefferson Co., July, 1920, *Clokey 3776* (Cl); near Boulder, July, 1902, *Tweedy 5068* (NY); Clear Creek-Middle Park, 1861, *Parry 101* (G, NY); Platte River, Evans, June, 1910, *E. L. Johnston 633 & 633b* (NY).

P. vitulifera has two close relatives in *P. floribunda* and *P. Osterhoutii*. Its position appears to be somewhat intermediate between these two species both morphologically and geographically. The plant ranges along the western edge of the plains and in canyons and valleys toward the interior of the central Rocky Mountains of Colorado. *P. Osterhoutii* occurs northwest and *P. floribunda* occurs to the south and west of this area.

The basal leaves of *P. vitulifera* are similar to those of *P. floribunda*, but they are nearly always obtuse instead of acute and obovate instead of broadly oblanceolate. The fruits are angular, rigid in appearance and not highly inflated. Stellae on the siliques are not appressed as on the foliage, but, as in *P. Osterhoutii*, spread at almost right angles from it. As a biological entity, the boundaries of *P. vitulifera* are seemingly well defined; however, recent connections with its relatives are strongly indicated.

12. P. OSTERHOUTII Payson. Perennial, caespitose, silvery-stellate throughout, rays of stellae usually forked; caudex simple or branched; stems slender, numerous, erect or somewhat decumbent, arising laterally, simple, 8–15 cm. long including the raceme; basal leaves oblanceolate, often hastate, incised or with broad teeth along the petiole, rarely entire, 2–5 cm. long, 8–15 mm. wide; cauline linear-oblanceolate, acute, entire or rarely with a few teeth, 1–2 cm. long, 2–3 mm. wide; inflorescence congested, flowers numerous; sepals linear-oblong, yellowish, pubescent, 5–7 mm. long, about 1 mm. wide; petals yellow, spatulate, 8–10 mm. long, 3–4 mm. wide; pedicels recurved in fruit, 1–1.5 cm. long; fruiting raceme congested, 4–8 cm. long; siliques pendant, base truncate or obtuse, apex deeply emarginate; valves inflated but not highly so, 5–7 mm. long, 4–5 mm. broad,

rather loosely stellate-pubescent; replum oblong or slightly broader, obtuse at apex, 2–3 mm. long; style 4–5 mm. long; ovules 2 on each side of replum; seeds orbicular, marginless, 1–2 in each loculus, about 2 mm. broad.—Ann. Mo. Bot. Gard. **5**: 146 (1918).—COLORADO: Kremmling, Grand Co., June, 1907, *Osterhout 3477* (NY ISOTYPE 2 sheets); Sulphur Springs, July, 1907, *F. E. Clements* (NY).

This species is very closely related to *P. vitulifera*, differing only in a few characters which appear to be of relatively minor importance. *P. Osterhoutii* has more slender nearly entire basal leaves which are acute instead of obtuse as in *P. vitulifera*, more numerous stems and a pendant instead of erect silique. The distinctness of the entity as a species must remain in doubt at present. Certainly a larger series of specimens together with accurate field data are needed to establish the range of variability and precise relationships of this unit. Its known range is entirely in north-central Colorado.

13. P. ACUTIFOLIA Rydberg. Perennial, caespitose, silvery stellate-pubescent throughout, stellae with branched rays; stems several to numerous, decumbent, simple, slender, 5–10 cm. long including fruiting raceme; basal leaves oblanceolate or broader, acute, entire or with one or two broad teeth, 2–3.5 cm. long, 5–10 mm. wide, blades sometimes triangular; cauline few, oblanceolate, entire, acute, 1–1.5 cm. long, 2–4 mm. wide; inflorescence congested, elongating moderately in fruit; sepals linear, 5–7 mm. long, 1 mm. wide; petals yellow, spatulate, often somewhat truncate at apex, 8–10 mm. long, 2–3 mm. wide; pedicels spreading, somewhat sigmoid, 5–8 mm. long; siliques erect, didymous, inflated, slightly cordate at base or nearly obtuse, apical sinus broad and deep; valves suborbicular, 4–5 mm. wide, 6–8 mm. high; replum obovate to slightly longer, obtuse at apex, rarely somewhat constricted toward base, about 3 mm. long, about 1.5 mm. wide; style 5–7 mm. long; ovules 2 on each side of replum; seeds orbicular, brown, only slightly flattened, about 2 mm. broad, 1–2 in each loculus.—Bull. Torr. Bot. Club. **18**: 279 (1901); Rydb., Fl. Colo. 154 (1906) in part; Fl. Rky. Mts. Adj. Pl. 331 (1917) in part; Payson in Ann. Mo. Bot. Gard. **5**: 145 (1918). *P. floribunda* Nelson, Coulter & Nelson Man. Cent. Rky. Mts., 218 (1909) in part.—COLORADO: Grand Junction, Mesa Co., June, 1892, *A. Eastwood* (NY TYPE); South Park, *Wolf & Rothrock 642* (G); Steamboat Springs, Routt Co., July, 1903, *Goodding 1623* (G, NY, US); Ruxton Ridge, Pikes Peak, July, 1901, *F. E. & E. S. Clements 97* (G, NY, US); 10 mi. east of Sapinero, Gunnison Co., May, 1938, *Rollins 2106* (G, R); 5 mi. east of Parlin, Gunnison Co., May, 1938, *Rollins 2088* (G, R); Caldwell Cr., Rio Grande Nat. Forest, Mineral Co., June, 1911, *Murdoch 4542* (NY).

P. acutifolia belongs to the *floribunda-Osterhoutii-vitulifera* group, but differs from all in having smaller entire acute leaves, slender short

stems and an obovate unconstricted replum. Of this group, *P. floribunda* stands closest to *P. acutifolia* and it is quite possible that further investigation will show them to be varieties or phases of a single species. More field-work in the area where these species occur will be necessary before the case can be fully clarified. At present it seems that the dissected basal leaves, descending or obliquely spreading pedicels, greater size and linear-oblong constricted replum of *P. floribunda* are sufficient to distinguish it from its near relative. *P. acutifolia* is found at middle elevations in the central Rocky Mountains of Colorado and is known to be particularly abundant in the Gunnison Basin.

14. P. FLORIBUNDA Rydberg. Perennial, caespitose, silvery stellate-pubescent throughout, stellae with branched rays; stems numerous, simple, arising laterally, decumbent or erect, 1–2 dm. long including the fruiting raceme; radical leaves broadly oblanceolate, pinnatifid or merely dentate, rarely almost entire, 4–8 cm. long, 1–2 cm. wide, terminal lobe acute or obtuse but not rounded, petiole usually winged; cauline spatulate to linear-oblanceolate, acute, entire or rarely few-toothed, 1–3 cm. long, 3–6 mm. wide; inflorescence loosely racemose, greatly elongating in fruit; sepals linear-oblong, 5–7 mm. long, 1–2 mm. wide; petals yellow, spatulate, 9–11 mm. long, about 3 mm. wide; pedicels spreading or somewhat recurved, usually sigmoid, slender, 6–12 mm. long; siliques erect divergent or nearly pendant, didymous, inflated but not greatly so, obtuse or slightly cordate at base, deeply and broadly notched above, valves 4–6 mm. high, 3–5 mm. wide; replum linear-oblong, constricted, 2.5–4 mm. long, less than 1 mm. wide, obtuse at apex, ovules 2 on each side; style 5–8 mm. long; seeds brown, orbicular, about 2 mm. broad, marginless, 1–2 in each loculus.—Bull. Torr. Bot. Club **18**: 279 (1901); Fl. Colo. 154 (1906) in part; Coulter & Nelson, Man. Cent. Rky. Mts. 218 (1909) in part; Rydb., Fl. Rky. Mts. Adj. Pl. 330 (1917); Payson in Ann. Mo. Bot. Gard. **5**: 146 (1918).—COLORADO: west slope LaVeta Pass, Costilla Co., *McKelvey 4787 & 4789* (G); *Bethel, Willey & Clokey 4130* (Cl, G); Sangre de Cristo Creek, July, 1900, *Rydberg & Vreeland 6135* (NY TYPE); *Rydberg & Vreeland 6136* (NY); Cimarron, Gunnison Co., June, 1901, *Baker 38* (G, NY, US); 3 mi. east of Sapinero, Gunnison Co., May, 1938, *Rollins 2108* (G, R); Wolcott, July, 1898, *Shear & Bessey 5295* (NY, US); Glenwood Springs, Garfield Co., June, 1920, *Osterhout* (Cl); Ruxton, Pikes Peak, 1896, *Clements 160* (NY); Bostwick Park, Montrose Co., Aug., 1937, *Rollins 1983* (G, R); July, 1917, *Payson* (US); Ridgway, Ouray Co., June, 1924, *E. B. & L. B. Payson 3832* (G); 3 mi. ne. of Cedaredge, Delta Co., May, 1938, *Rollins 2150* (G, R); 10 mi. n. of Mesa, Mesa Co., May, 1938, *Rollins 2194* (G, R); near Mesa, Mesa Co., May, 1938, *Rollins 2197* (G, R). NEW MEXICO: 10 miles east of Taos, Taos Co., July, 1938, *Rollins & Chambers 2414* (G, R).

P. floribunda is not only more robust than its immediate relatives, but differs from them markedly on characters of the fruits, pedicels and radical leaves. The relationships of this species have been discussed above and need not be stressed further. It is believed that the collection above cited from New Mexico represents the first record of this species from that state.

Explanation of Plate 556

Physaria condensata, n. sp.: fig. 1, plant, × 1; fig. 9, replum, × 2½; fig. 10, silique, × 2½; from *Rollins 2385*.

P. brassicoides Rydb.: fig. 2, silique, × 1½; fig. 3, replum, × 2½; from *Rydberg 24*.

P. acutifolia Rydb.: fig. 4, silique, × 1½; fig. 5, replum, × 2½; from *Eastwood* in 1892.

P. didymocarpa (Hook.) Gray: fig. 6, replum, × 2½; from *Macoun 89*.

P. vitulifera Rydb.: fig. 7, replum, × 2½; fig. 8, silique, × 1½; from *Rydberg*, Aug. 26, 1895.

P. floribunda Rydb.: fig. 11, silique, × 1½; fig. 12, replum, × 2½; from *Rydberg* and *Vreeland 6136*.

P. Osterhoutii Pays.: fig. 13, replum, × 2½; fig. 14, silique, × 1½; from *Osterhout 3477*.

P. Chambersii, n. sp.: fig. 15, replum, × 2½; fig. 16, silique, × 1½; from *Rollins* and *Chambers 2502*.

P. Chambersii Rollins, var. membranacea, n. var.: fig. 17, silique, × 1½; fig. 18, replum, × 2½; from *Rollins* and *Chambers 2448*.

P. australis (Payson) n. comb.: fig. 19, silique, × 1½; fig. 20, replum, × 2½; from *Rollins 1653*.

P. Newberryi Gray: fig. 21, silique, × 1½; fig. 22, replum, × 2½; from *Osterhout 7000*.

P. alpestris Suksdorf: fig. 23, replum, × 2½; fig. 24, silique, × 1½; from *Thompson 8108*.

P. Geyeri (Hook.) Gray: fig. 25, replum, × 2½; fig. 26, silique, × 1½; from *Henderson 2384*.

P. oregona Wats.: fig. 27, silique, × 1½; fig. 28, replum, × 2½; from *Cusick 1895*.

III. THE VARIETIES OF CONVOLVULUS SPITHAMAEUS AND OF C. SEPIUM

R. M. Tryon, Jr.

(Plates 557 and 558)

Plant erect; flowers usually 1–2, rarely 3–4, white; basal leaves not more than one-half as long as some of the upper leaves, often greatly reduced; petioles not more than one-half as long as the blade, usually not more than one-fourth as long. . . . . *C. spithamaeus.*

Plant extensively twining or trailing; flowers several in mature specimens, more than 4, white or pink; basal leaves only slightly reduced; petioles more than one-half as long as the blade . . . . . *C. sepium.*

C. SPITHAMAEUS L.

Plant pubescent or glabrate, short, compact, the tip not prolonged; leaves usually truncate, rounded or auricled at the base, sometimes sagittate; petiole of the first leaf above the uppermost flower not more than one-fourth as long as the blade.....*C. spithamaeus* (typical).

Plant densely pubescent, tall, the tip prolonged; leaves sagittate; petiole of the first leaf above the uppermost flower about one-half as long as the blade.....var. *Catesbeianus*.

CONVOLVULUS SPITHAMAEUS L., Sp. Pl. 158 (1753) (typical).[1] PLATE 557, FIGS. 1, 2. *Convolvulus stans* Michx., Fl. Bor.-Am. **2**: 136 (1803). *Calystegia spithamaea* (L.) Pursh, Fl. Am. Sept. **1**: 143 (1814). *Volvulus spithamineus* O. Ktze., Rev. Gen. **2**: 447 (1891). *Convolvulus camporum* Greene, Pittonia **3**: 328 (1898). *Volvulus spithamaeus* (L.) Farwell in Am. Midl. Nat. **9**: 274 (1925). *Volvulus spithamaeus* (L.) Farwell var. *stans* (Michx.) Farwell in Am. Midl. Nat. **9**: 274 (1925). *Convolvulus spithamaeus* L. var. *stans* (Michx.) Fogelberg in Trans. Wis. Acad. Sci. **30**: 24 (1937).

The type specimen of *C. spithamaeus* is pubescent, erect, short and compact, the leaves slightly rounded at the base or auricled, the petiole of the first leaf above the uppermost flower not more than one-fourth as long as the blade. This description must be extended to include several minor variations: plant densely pubescent to glabrate, erect, short and compact or sometimes tall; the leaves about 2–6 cm. long, 1–2.5 cm. wide, tapering, rounded, auricled or sagittate at the base; petiole of the first leaf above the uppermost flower 0.2–1.5 cm. long, usually not more than one-fourth as long as the blade, rarely nearly one-third as long.

Southwestern Quebec to Ontario and Minnesota, south to Iowa, Illinois, Pennsylvania and Maryland and in the mountains to West Virginia and Virginia. Representative specimens: QUEBEC: Hull, June 12, 1925, *Rolland-Germain*, no. 19,308. MAINE: Limingston, York Co., Aug. 29, 1916, *Fernald, Long & Norton*, no. 14,414. NEW HAMPSHIRE: Merrimack, Hillsboro Co., June 19, 1918, *C. F. Batchelder*. MASSACHUSETTS: Dunstable, Middlesex Co., June 9, 1928, *Bill, Grigg & Sanford*. CONNECTICUT: Southbury, New Haven Co., June 9, 1906, *G. H. Bartlett*, no. 1,236. NEW YORK: Glenmont, Albany Co., June 14, 1923, *House*, no. 9,331. NEW JERSEY: Riddleton, June 14,

[1] Index Kewensis **3**: 236 (1894) gives several combinations under *Milhania*, a genus taken from Necker by Rafinesque and applied by him to *Calystegia* of R. Brown. The combinations are credited to Rafinesque, Fl. Tell. **4**: 71 (1838) but he actually did not make any combinations under *Milhania*. He probably made the combinations under "*Calistegia*" R. Br. but since he also mentions *Convolvulus*, and says only "*C. sepium*" etc., and since all except three of his own names are without basinym, reference or description, all of the names are ignored.

CONVOLVULUS SPITHAMAEUS: FIG. 1, type, × 2/3; FIG. 2, plant, × 1/2, from Ontario.
C. SPITHAMAEUS, var. CATESBEIANUS: FIG. 3, type, × 1/2.

CONVOLVULUS SEPIUM: FIG. 7, leaf and flower, × 1/3, from England.
C. SEPIUM, var. COMMUNIS: FIGS. 1 and 2, leaf and flower, × 1/2, from TYPE.
C. SEPIUM, var. AMERICANUS: FIG. 3, plant, × 1/3.
C. SEPIUM, var. FRATERNIFLORUS: FIGS. 4 and 5, leaf and flower, × 1/3, from North Dakota; FIG. 6, leaf and flower, × 1/3, from Missouri (TOPOTYPE).
C. SEPIUM, var. REPENS: FIG. 8, TYPE, × 1/2.
C. SEPIUM, var. REPENS, forma NASHII: FIG. 9, leaf, × 3/4.

1895, *C. D. Lippincott.* PENNSYLVANIA: Frazer, Chester Co., June 18, 1910, *E. B. Bartram.* MARYLAND: Chevy Chase, May 27, 1905, *A. Chase*, no. 2,846. DISTRICT OF COLUMBIA: Washington, June 4, 1882, *L. F. Ward.* WEST VIRGINIA: Wardensville, Hardy Co., July 10, 1932, *Hunnewell*, no. 12,417. VIRGINIA: Warm Spring Mt., Bath Co., July 6, 1933, *Hunnewell*, no. 12,916. ONTARIO: Tobermory, June 24, 1934, *Krotkov*, no. 9,340. MICHIGAN: Norway, Dickinson Co., July 8, 1934, *Fernald & Pease*, no. 3,485. KENTUCKY: Fleming Co., June 4, 1938, *E. L. Braun.* WISCONSIN: Minong, Washburn Co., June 19, 1929, *Fassett*, no. 8,635. ILLINOIS: Dear Park, La Salle Co., June 1–7, 1909, *Greenman, Lansing & Dixon*, no. 138. MINNESOTA: North Lake, Cook Co., July 3, 1917, *Lange*, no. 12.

C. SPITHAMAEUS L. var. **Catesbeianus** (Pursh), n. comb. PLATE 557, FIG. 3. *Calystegia Catesbeiana* Pursh, Fl. Am. Sept. **2**: 729 (1814). *Convolvulus Catesbeianus* (Pursh) Elliot, Sketch **1**: 255 (1817). *Convolvulus Catesbei* Spreng., Syst. **1**: 603 (1825). *Convolvulus sepium* L. var. *Catesbeianus* (Pursh) Fernald in RHODORA **37**: 439 (1935), as to name-bringing synonym.—Plant densely pubescent, tall, the tip prolonged; leaves 3 6 cm. long, 2–3 cm. wide, sagittate; petiole of the first leaf above the uppermost flower 1–3 cm. long, at least one-third as long as the blade.—In the mountains from Virginia to "Carolina," Georgia and Alabama. Representative specimens: VIRGINIA: Holston River near Add Wolf, Smyth Co., June 15, 1892, *J. K. Small;* Bedford Co., June 19, 1871, *A. H. Curtiss.* GEORGIA: Stone Mt., May 14, 1901, *A. H. Curtiss*, no. 6,784. ALABAMA: Auburn, Lee Co., April 17, 1897, *Earle & Baker.*

The description has been drawn from a photograph of the type specimen secured by Prof. Fernald through the kindness of Dr. Nicholas Polunin. There has been some confusion in the application of Pursh's name but a study of the type clearly shows that it belongs under *C. spithamaeus* rather than under *C. sepium*, where it was formerly placed.

Synonyms of an intermediate between *C. spithamaeus* and var. *Catesbeianus* are: *Calystegia tomentosa* Pursh, Fl. Am. Sept. **1**: 143 (1814). *Convolvulus stans* sensu Wherry in Torreya **29**: 105 (1929), not Michx. *Convolvulus Purshianus* Wherry in Proc. Pa. Acad. Sci. **7**: 163 (1933).

This species, although admittedly variable, has been commonly considered to have no segregates. Pursh separated a *Calystegia tomentosa* but he was not followed by later authors. Greene in 1898 described a *Convolvulus camporum* from the Middle West but his description fits typical *Convolvulus spithamaeus* perfectly and it is not clear why he thought his material was distinct. Wherry in 1929

revived Michaux's *Convolvulus stans*, described from near Lake Champlain, to represent material he collected on shale-barrens in Pennsylvania. Later, after collecting *Convolvulus spithamaeus* near Montreal and recognizing that the northern plant was "merely a hairy extreme of *C. spithamaeus*" and not identical with his Pennsylvania material, he described the la ter as *Convolvulus Purshianus*, based on *Calystegia tomentosa* Pursh. This is an intermediate between typical *Convolvulus spithamaeus* and var. *Catesbeianus*.

In 1925 Farwell recognized *Convolvulus stans* Michx. as a variety under *Volvulus spithamaeus* and in 1937 Fogelberg recognized it under *Convolvulus spithamaeus*. The bulk of *Convolvulus spithamaeus* may be roughly divided into two groups: one very pubescent with sagittate leaves (this is Michaux's plant which he described as "totus candi-candi-subtomentosus: foliis . . . subcordato-ovalibus . . ."); the other less pubescent, with tapering, rounded or auricled leaf-bases. The first (PLATE 557, FIG. 2) is the common northern form, from Quebec to Minnesota, extending southward in New York and Pennsylvania in the mountains; the second (PLATE 557, FIG. 1) is the common form in Iowa, Illinois, Indiana, Ohio, New York, Pennsylvania and the seaboard states. However, because there is no good correlation between leaf-shape and pubescence and because the ranges overlap a great deal, there is no reasonable basis on which to separate these two variations.

However, var. *Catesbeianus* is an apparently overlooked southern series of *Convolvulus spithamaeus*, extending from Virginia to Alabama along the Appalachian System, which, varying only slightly from the typical form in Pennsylvania, reaches an extreme in Georgia and Alabama.

C. SEPIUM L.

This species is quite variable in leaf-shape, flower-color and pubescence and, although good technical characters have been sought as a basis of separation, none have been found, and it is necessary to fall back on vegetative characters and flower-color to segregate several fairly good geographical varieties.

Leaves hastate, the blade proper usually more than one-half as broad as long, or essentially sagittate; basal lobes angled.
Leaves essentially sagittate; peduncles about twice as long as the petioles, often exceeding the leaves . . . . . *C. sepium* (typical).
Leaves hastate; peduncles usually longer than the petioles but not exceeding the leaves.

Corolla pink, plant essentially glabrous.....var. *communis.*
Corolla white, plant glabrous or pubescent.....var. *fraterniflorus.*

Leaves usually sagittate, or if hastate the blade proper less than one-half as broad as long; basal lobes rounded or slightly pointed.

Corolla pink; peduncles often exceeding the leaves.....var. *americanus.*
Corolla white, rarely tinged with pink on the margin; peduncles usually shorter than the leaves.

Leaf-blade not conspicuously narrow, mostly glabrate.....var. *repens.*
Leaf-blade very narrow, mostly densely pubescent..var. *repens* f. *Nashii.*

CONVOLVULUS SEPIUM L., Sp. Pl. 143 (1753) (typical). PLATE 558, FIG. 7. *Calystegia sepium* (L.) R. Br., Fl. Nov. Holl. 483 (1810). *Volvulus sepium* (L.) Junger in Oest. Bot. Zeitschr. **41**: 133 (1891).—Plant essentially glabrous; leaves about 4–10 cm. long, 3.5–7 cm. wide, hastate-sagittate or sagittate, with the basal lobes angled; corolla white; peduncles 3–7 cm. long, about twice as long as the petioles, often exceeding the leaves.—Introduced sparingly from Europe. Representative specimens: GERMANY: Regensburg, Bavaria, July 1906, *Ig. Familler.* ITALY: Venitia, June 1911, *A. Beguinot*, no. 1,728. NEWFOUNDLAND: St. Johns, 1928, *A. M. Ayre.* NOVA SCOTIA: Yarmouth, Yarmouth Co., July 24, 1920, *Long & Linder*, no. 22,326. NEW BRUNSWICK: Ingleside, Kings Co., Aug. 8, 1909, *Fernald.*

Var. **communis**, n. var., corolla rosea; folia hastata, basi lobis angularis; planta prope glabra. TAB. 558, FIG. 1, 2. *Calystegia Maximilliana* Nees in Neuwied, Riese Nord. Am. **2**: 443 (1841) probably belongs here. *Convolvulus sepium* L. var. *americanus* sensu authors, not Sims.—Plant essentially glabrous; leaves about 5–10 cm. long, 2–5 cm. wide, hastate, the basal lobes angled; corolla pink; peduncles 4–12 cm. long, usually exceeding the petioles but rarely the leaves.—Southern Quebec south to Virginia and sparingly to Florida, west to Minnesota, Oregon and Washington. This is the common plant throughout the northeastern United States. Representative specimens: QUEBEC: Bonaventure River, Gaspé Co., Aug. 14, 1930, *Victorin, Germain & Jacques*, no. 33,752. MAINE: Frankfort, Waldo Co., July 21, 1916, *Fernald & Long*, no. 14,417. NEW HAMPSHIRE: Colebrook, Coos Co., July 17, 1907, *A. H. Moore*, no. 3,927. VERMONT: Manchester, Bennington Co., July 14, 1898, *M. A. Day*, no. 122. MASSACHUSETTS: Dennis, Barnstable Co., Aug. 16, 1919, *Fernald & Long*, no. 19,025. CONNECTICUT: Farmington, Hartford Co., Aug. 2, 1902, *Driggs & Holcomb.* NEW YORK: Oneida Lake, Madison Co., Aug. 18, 1930, *House*, no. 17,891. NEW JERSEY: Merchantville, Camden Co., June 2, 1921, *H. B. Meredith.* PENNSYLVANIA: Wissahickon Creek, Philadelphia Co., June 29, 1924, *H. A. Lang.* FLORIDA: 1844, *F. Rugel*, no. 155. OHIO: Mansfield, June 17, 1895, *Wilkinson*, no. 7,662 (TYPE in the Gray Herbarium). ILLINOIS: Stony Island, Cook Co., June 30, 1914, *H. H. Smith*, no. 5,972. MINNESOTA: Thompson, July 1891, *J. H. Sandberg*, no. 389. OREGON: Salem, Aug. 10, 1920, *J. C. Nelson*, no. 3,296. WASHINGTON: Almota, Aug. 9, 1896, *C. V. Piper.*

Var. AMERICANUS Sims in Bot. Mag. t. 732 (1804). PLATE 558, FIG. 3. *Convolvulus inflatus* Desf., Tabl. l'École Bot. 74 (1804), nomen nudum, identity inferred by reference in Sweet, Hort. Brit. Ed. 2, 370 (1830). *Calystegia inflata* Desf. ex Sweet, Hort. Brit. Ed. 2, 370 (1830) by reference to Bot. Mag. t. 732. *Convolvulus sepium* var. *incarnatus* Sweet, Hort. Brit. Ed. 2, 370 (1830), published in synonymy. *Calystegia riparia* Raf., New Fl. Am. **2**: 29 (1837), ex char. *Convolvulus sepium* L. var. *rosea* Choisy, in DC. Prod. **9**: 433 (1845). *Calystegia sagittata* Turcz. in Bull. Imp. Nat. Soc. Mosc. **22**^{2}: 56 (1849), ex char. *Convolvulus americanus* (Sims) Greene, Pittonia **3**: 328 (1898). *Volvulus sepium* (L.) Junger var. *americanus* (Sims) Farwell in Ann. Rep. Comm. Parks & Boulev. Detroit **11**: 81 (1900). *Calystegia americana* (Sims) Daniels in Univ. Mo. Studies; Sci. Series 1, no. 2, 195 (1907). *Volvulus* "*inflatus* (Desf.) Dr." [uce], Brit. Pl. List 82 (1928), with *taxonomic* synonym, "*Convolvulus sylvat.*[*icus*] W. & K.," as shown by basinym of *Convolvulus inflatus* Desf. supplied by Druce in Rep. Bot. Exch. Cl. Brit. Isles **8**: 872 (1929). *Convolvulus sepium* L. var. *pubescens* (Gray) Fernald, sensu Fernald in RHODORA **10**: 55 (1908).—Plant usually pubescent or sometimes essentially glabrous; leaves about 4–10 cm. long, 3–6 cm. wide, sagittate, the basal lobes rounded or slightly pointed; corolla pink; peduncles 6–12 cm. long, often exceeding the leaves.—Newfoundland, southern Quebec and Nova Scotia, south along the coast to Maryland and Virginia; also about the Great Lakes in Ontario, Michigan, Ohio, Indiana, Wisconsin and Minnesota. Representative specimens: NEWFOUNDLAND: Southeast Arm, Bonne Bay, Aug. 31, 1910, *Fernald & Wiegand*, no. 3,918. QUEBEC: Anticosti, Aug. 1, 1925, *Victorin, Germain & Marie*, no. 22,046. PRINCE EDWARD ISLAND: Indian River, Prince Co., Aug. 29, 1912, *Fernald, Long & St. John*, no. 7,954. NOVA SCOTIA: Eel Lake, Yarmouth Co., July 27, 1920, *Fernald, Bean & White*, no. 22,323. NEW BRUNSWICK: Bay du Vin Island, Sept. 18, 1913, *Blake*, no. 5,702. MAINE: Roque Bluffs, Washington Co., Aug. 11, 1907, *Cushman & Sanford*, no. 1,640. NEW HAMPSHIRE: Dover, Strafford Co., June 25, 1933, *Hodgdon*, no. 373. VERMONT: Rock Point, Burlington, July 12, 1894, *Eggleston*. MASSACHUSETTS: Oak Bluffs, Marthas' Vineyard, June 29, 1916, *Seymour*, no. 1,322. RHODE ISLAND: Block Island, Newport Co., Aug. 22, 1913, *Fernald, Hunnewell & Long*, no. 10,253. CONNECTICUT: Old Lyme, New London Co., June 13, 1912, *A. E. Blewitt*, no. 1,575. NEW YORK: Southampton, Long Island, Suffolk Co., July 25–Aug. 3, 1920, *H. St. John*, no. 2,887. NEW JERSEY: Milltown, May 1891, *Halsted*, no. 56. PENNSYLVANIA: Tinicum, Delaware Co., June 12, 1899, *A. MacElwee*, no. 526. DELAWARE: Oak Orchard, Sussex Co., Aug. 11, 1934, *Fernald & Long*, no. 4,148. MARYLAND: Havre de Grace, Aug. 3, 1923, *Tidestrom*, no. 11,590. VIRGINIA: Sea beach, Buckroe, May 16, 1912, *Robinson*, no. 357. ONTARIO: Tobermory, Bruce Co., July 3, 1933, *Krotkov*, no. 7,721. OHIO: Huron, Erie Co., Aug. 13, 1896, *E. L. Mosely*. MICHIGAN: Ann Arbor, Washtenaw Co., June

9, 1899, *S. H. Burnham.* INDIANA: East Chicago, Lake Co., June 24, 1920, *Peattie.* MINNESOTA: Swan Lake, Nicollet Co., June 1892, *C. A. Ballard.*

Choisy cited *C. repens* L. as a synonym of his var. *rosea* but this was an error and his varietal name cannot be used for the Linnaean plant. The type of *C. repens* L. is *Clayton,* no. 665, on which is written ". . . flore niveo, margine dilute rubente . . ." This is clearly not the plant which Choisy described with "corolla rosea ampla" and illustrated by reference to Bot. Mag. t. 732. Choisy's name is clearly referable to var. *americanus* Sims, not to *C. repens* L.

Although Sims' name has long been used for the common American plant (var. *communis*) his illustration shows the leaves sagittate, not hastate, and his name must be taken up for the sea-coast plant previously placed under var. *pubescens.*

Var. REPENS (L.) Gray, Syn. Fl. N. Am. **2**[1]: 215 (1878). PLATE 558, FIG. 8. *Convolvulus repens* L., Sp. Pl. 158 (1753). *Calystegia villosa* Raf., Fl. Ludov. (1817), ex char. *Convolvulus lactescens* Gronov. ex Choisy, in DC. Prod. **9**: 433 (1845), published in synonymy. *Calystegia sepium* (L.) R. Br. var. *repens* Gray, Man. Bot. 348 (1848). *Calystegia sepium* (L.) R. Br. var. *pubescens* Gray, Man. Bot. Ed. 5, 376 (1867). *Volvulus sepium* (L.) Junger var. *biangulo-sagittata* O. Ktze., Rev. Gen. **2**: 447 (1891). *Convolvulus sepium* L. var. *pubescens* (Gray) Fernald in RHODORA **10**: 55 (1908), as to name-bringing synonym. *Volvulus sepium* (L.) Junger var. *pubescens* (Gray) Farwell in Am. Midl. Nat. **12**: 130 (1930). *Convolvulus sepium* L. var. *Catesbeianus* (Pursh) Fernald, sensu Fernald in RHODORA **37**: 439 (1935).—Plant pubescent or essentially glabrous; leaves about 5–9 cm. long, 1.5–3 cm. wide, sagittate or sometimes hastate, the basal lobes rounded; corolla white or sometimes with a pink margin; peduncles usually 5–6 cm. long, not exceeding the leaves.—Primarily a Coastal Plain variety from Rhode Island to Florida, Alabama, Louisiana and Missouri, but also in the mountains of West Virginia. Representative specimens: RHODE ISLAND: Block Island, Newport Co., Sept. 14, 1913, *Fernald, Long & G. S. Torrey.* DISTRICT OF COLUMBIA: June 25, 1896, *E. S. Steele.* WEST VIRGINIA: Lost River, Hardy Co., Aug. 18, 1931, *E. L. Core,* no. 3,727. VIRGINIA: Jordan Point, Prince George Co., Aug. 16, 1938, *Fernald & Long,* no. 9,129, Sept. 16, 1938, no. 9,410. SOUTH CAROLINA: Morris Island, 1864, *Grosvenor.* GEORGIA: Darien, McIntosh Co., July 25, 1927, *Wiegand & Manning,* no. 2,639. FLORIDA: Jacksonville, April, *Curtiss,* no. 2,172. MISSOURI: St. Louis Co., July 1875, *H. Eggert.*

An extreme form in Florida which extends northward to South Carolina is f. **Nashii** (House), n. comb. (*Convolvulus Nashii* House in Muhl. **5**: 66 (1909)) with the leaf-blade very narrow, about 1 cm.

wide, usually densely pubescent and the basal lobes widely spreading. PLATE 558, FIG. 9. Representative specimens: FLORIDA: Eustis, Lake Co., March 12–31, 1894, *Nash*, no. 44, May 1–15, no. 609 (TYPE NUMBER).

Var. *pubescens* Gray was not clearly defined when published and the name has been used for the northern sea-coast plant (var. *americanus*). There is no specimen in the Gray Herbarium labeled var. *pubescens* by Gray but he placed his var. *pubescens* in synonymy under var. *repens* in the Synoptical Flora and, although his definition of var. *repens* was broader than that of Linnaeus, an examination of the specimens labeled var. *repens* by him shows them all to be the southern plant described by Linnaeus. Since he had these specimens before him when he reduced var. *pubescens* to a synonym of var. *repens*, it is only logical to consider the former name as a synonym of the latter.

The type of *Volvulus sepium* (L.) Junger var. *biangulo-sagittata* O. Ktze. has been examined, through the courtesy of Dr. Gleason, and clearly belongs under var. *repens* (L.) Gray.

Var. FRATERNIFLORUS Mack. & Bush, Man. Fl. Jackson Co., Mo. 153 (1902). PLATE 558, FIGS. 4–6. *Convolvulus fraterniflorus* (Mack. & Bush) Mack. & Bush in Rep. Mo. Bot. Gard. **16**: 104 (1905).—Plant pubescent or essentially glabrous; leaves about 3–9 cm. long, 2–5 cm. wide, hastate, the basal lobes angled; corolla white; peduncles about 4–8 cm. long, usually exceeding the petioles but rarely the leaves.—Illinois to Montana, south to Arkansas and New Mexico. Representative specimens: ILLINOIS: Peoria, July 1903, *F. E. McDonald*. IOWA: Ames, July 1909, *Campbell*, no. 43. MISSOURI: Martin City, June 28, 1905, *Bush*, no. 3,037 (type locality). ARKANSAS: northwestern Ark., July, *F. L. Hawey*, no. 119. NORTH DAKOTA: Fargo, Aug. 23, 1901, *Waldron & Manns*. KANSAS: Rieley Co., June 18, 1895, *J. B. Norton*, no. 353. MONTANA: Gallatin Co., Aug. 5, 1901, *W. W. Jones*. COLORADO: New Windsor, Weld Co., July 31, 1906, *Osterhout*, no. 3,456. NEW MEXICO: Las Vegas, July 1881, *G. R. Vasey*.

Mackenzie and Bush described var. *fraterniflorus* from Missouri as a pubescent plant with large bracts and usually paired flowers. However, their material is only a small part of a larger, white-flowered series, growing throughout the Prairie and Great Plain regions.

EXPLANATION OF PLATES 557 AND 558

PLATE 557. CONVOLVULUS SPITHAMAEUS L.: FIG. 1, plant, × ⅔, (TYPE); FIG. 2, plant, × ½ from Ontario.

Var. CATESBEIANUS (Pursh) Tryon: FIG. 3, plant, × ½ (TYPE).

PLATE 558. CONVOLVULUS SEPIUM L. (typical): FIG. 7, leaf and flower, × ⅓, from England.

Var. COMMUNIS Tryon: FIGS. 1–2, leaf and flower, × ½, from TYPE.
Var. AMERICANUS Sims: FIG. 3, plant, × ⅓.
Var. FRATERNIFLORUS Mack. & Bush. FIGS. 4–6: FIGS. 4–5, leaf and flower, × ⅓, from Fargo, North Dakota; FIG. 6, leaf and flower, × ⅓, from Martin City, Missouri (TYPE LOCALITY).
Var. REPENS (L.) Gray: FIG. 8, plant, × ½ (TYPE).
Var. REPENS (L.) Gray f. NASHII (House) Tryon: FIG. 9, leaf, × ¾.

IV. NEW SPECIES, VARIETIES AND TRANSFERS

M. L. FERNALD

(Plates 559–569)

IN THE COURSE of studies on the flora of the northeastern United States and adjacent Canada and Newfoundland numerous items have accumulated which need discussion or clarification. In so far as they are in form for publication they are here presented.

CYPERUS DIANDRUS Torr., forma **elongatus** (Britton), comb. nov. *C. diandrus*, var. *elongatus* Britton in Bull. Torr. Bot. Cl. xix. 226 (1892).

Typical *Cyperus diandrus* has the spikelets 6–32-flowered and 0.4–1.8 cm. long. Forma *elongatus*, which is scattered throughout the range of the typical form, has them much elongate (as in many species of the tribe), 40–50-flowered and 2–2.5 cm. long.

ARUNCUS **dioicus** (Walt.) comb. nov. *Actaea dioica* Walt. Fl. Carol. 152 (1788). *Aruncus alleghenicnsis* Rydb. in N. Am. Fl. xxii[3]. 256 (1908); Fernald in RHODORA, xxxviii. 180, t. 416, figs. 1, 2, 5 and 8 (1936).

A. DIOICUS, var. **pubescens** (Rydb.) comb. nov. *A. pubescens* Rydb. in N. Am. Fl. xxii[3]. 256 (1908). *A. alleghenicnsis* Rydb., var. *pubescens* (Rydb.) Fernald in RHODORA, xxxviii. 179, t. 416, fig. 4 (1936).

In 1936 I published photographs showing how the eastern North American *Aruncus* differs in details of flowers and fruits from the Old World *A. sylvester* Kostel. (1844); and I took up the name *A. alleghenicnsis* Rydb. (1908) for our plant. I then overlooked, as had Rydberg, the very early description of the Carolinian plant by Walter (June, 1788). *Aruncus* as a genus, rests upon the Old World *Spiraea Aruncus* L. and under the latter name the eastern American plant was known until the recent general acceptance of the genus *Aruncus*. *Aruncus* of the *Rosaceae* superficially resembles *Astilbe* of the *Saxifragaceae* and the two are frequently misidentified; *Astilbe* has perfect flowers,

Aruncus is dioecious. Walter's *Actaea dioica* was unusually well described:

> *dioica* 3. floribus paniculatis; corollis 4 ad 6 petalis viridescentibus; pericarpiis 5 ad 15 monospermis; foliis triternatis, foliolis obovatis lobatis integrisque; caulibus suffruticosis.

In February, 1839, Asa Gray, studying Walter's herbarium, made the memorandum: "*Actaea dioica!* = Spiraea Aruncus." Gray, maintaining our plant as *Spiraea Aruncus* L. and, subsequently, following the sensible, therefore discarded Kew rule, called it *Aruncus sylvester*. It is natural, therefore, that in Gray's own work Walter's name got overlooked. Some European and Asiatic botanists treat *Aruncus* as a variable circumboreal monotype. It should be noted that for the aggregate species of such authors the name *Aruncus dioicus*, based on a Walter name of 1788, has priority over all others yet brought forward.

ILEX MONTANA AND I. DUBIA (PLATE 559). In 1848, in the 1st edition of his Manual, Asa Gray published the new species *Ilex montana* Torr. & Gray in Gray, Man. 276 (1848). There already existed a *Prinos montanus* Swartz, Prodr. 58 (1788) and Gray, in 1856, thinking apparently of the specific rather than the generic name, changed his *I. montana* to *I. monticola* Gray, Man. ed. 2: 264 (1856), a substitute for "I. montàna, *ed.* 1, not Prinos montanus, *Sw.*" Of course, by present rules of nomenclature the original *Ilex montana* Torr. & Gray (1848) was the valid name, since there existed no other identical combination. But the suggestion once started, that there was perhaps something not quite regular in the nomenclatural situation, error after error has followed. It was not until thirteen years after the first and wholly correct publication of the combination *Ilex montana* (1848) that *Prinos montanus* Sw. was transferred to *Ilex*, and then by the barest technicality: "ILEX MONTANA, Griseb.—Syn. *Prinos montanus* et *P. sideroxyloides*, Sw.," published by Grisebach in Mem. Am. Acad. n. s. viii. (Plantae Wrightianae), 171 (1861); by a bare technicality because *P. montanus* and *P. sideroxyloides* are not conspecific. Nevertheless, following the example of Asa Gray, who threw aside the wholly right *I. montana* (1848) on account of Swartz's *Prinos montanus*, succeeding authors have mostly assumed that the Grisebach binomial of 1861 has priority over that of Torrey & Gray in 1848! In 1890, to be sure, Britton used the name correctly when he published *I. montana* T. & G., var. *mollis* (Gray) Britton in Bull. Torr. Bot. Cl. xvii. 313 (1890), based on *I. mollis* Gray (1867). For some reason, however, he

promptly abandoned the correct specific name and in 1894, in Mem. Torr. Bot. Cl. v. 217 (1894), took up *I. monticola* Gray (1856) with the synonym "*I. montana* T. & G.; A. Gray, Man. 276 (1848), not Griseb."; but in 1913 he returned, correctly it seems to me, to *I. montana*, in Ill. Fl. ed. 2, ii. 488 (1913). Trelease and some other American authors have also assumed the priority of Grisebach's combination. *Index Kewensis* did not catch the original *I. montana* T. & G. (1848) and gave only that of Grisebach (1861); furthermore it listed as maintained both *I. monticola* Tul. (1857) and *I. monticola* Gray, but started the latter from Gray, Man. ed. 5: 306 (1867), instead of from ed. 2: 264 (1856). Thus, if *Index Kewensis* is taken as the guide in these instances, both *I. montana* Griseb. and *I. monticola* Tul. have right-of-way, whereas they are both later homonyms. For the large-leaved and large-fruited shrub of the Blue Ridge and the Alleghenies the name *I. montana* Torr. & Gray is apparently correct.

Another series of errors started with the citation in the original publication of *Ilex mollis* Gray of the synonym "P[rinos]. ambiguus *Pursh*, not *Michx.*"; and by Trelease in Gray's Synoptical Flora, i. 390, of the citation under the same species, of *I. dubia* (G. Don) BSP., based on *P. dubius* G. Don. The citation of *P. ambiguus* would now be more correctly SENSU Pursh, not Michx. As to *P. dubius* the case seems in some ways clear; in others it is both dubious and ambiguous. The name *Prinos ambiguus* started in Michaux, Fl. Bor.-Am. ii. 236 (1803), for the small-leaved southern shrub, called *I. ambigua* (Michx.) Chapm. by Trelease and by Small, although, as shown by Rehder in Journ. Arn. Arboret. iii. 214 (1922), *I. ambigua* (Michx.) Chapm. must give way to *I. caroliniana* (Walt.) Trel. in Trans. Acad. Sci. St. Louis, v. 347 (1889), which rests on *Cassine caroliniana* Walt. Fl. Carol. 242 (1788). Michaux, who suggested similarity of his species to *Cassine caroliniana* Walt., described it as follows:

> AMBIGUUS. P. foliis ovalibus, utrinque acuminatis; pedicellis masc. 1-floris, ad imos ramunculos numerose congestis; foem. solitariis: florum partitione quaternaria.
> *Obs.* Interdum florum partitio quinaria; tunc videtur CASSINE *caroliniana*. WALTERI. Certo tamen *P. verticillati* LINN. congener.
> *Hab.* in Carolina.

Pursh somewhat altered the description to cover a different species and extended the range north to New Jersey, where *Prinos ambiguus* Michaux is unknown. Pursh's account was as follows:

ambiguus. 2. P. foliis deciduis ovalibus utrinque acuminatis mucronato-serrulatis subtus pubescentibus, floribus 4–5-fidis, masculis ad imos ramulos congestis, foemineis solitariis.—*Mich. fl. amer.* 2. *p.* 236.

Cassine caroliniana. *Walt. fl. car.* 242.

In sandy wet woods and on the borders of swamps: New Jersey to Carolina. ♄. July, Aug. *v. v.* Flowers white; berries red, larger than No. 1. [*P. verticillatus.*][1]

Obviously Pursh added something quite extraneous to the original *Prinos ambiguus* Michaux; but he was not intentionally publishing a new species. He definitely ascribed it to Michaux, and the Pursh amplification should, as already stated, be cited: *P. ambiguus* SENSU Pursh, not Michx. George Don, presumably not knowing either the shrub of Michaux or of Pursh, literally translated into English the account of Pursh, even to "in sandy woods, and on the borders of swamps, from New Jersey to Carolina," and appropriately renamed this shrub, which he probably did not know, *Prinos dubius* G. Don, Gen. Syst. Gard. Bot. ii. 20 (1832). In 1888, Britton, Stern & Poggenburg transferred *P. dubius* to *Ilex*, without a word of discussion, and with as little bibliographic citation as was given by Grisebach in publishing his *I. montana* (Sw.) Griseb., barely enough, presupposing a foregiving botanical public, to get by: Ilex "dubia, (Don). (*I. mollis, Gray.*)," BSP., Prelim. Cat. Anthoph. Pteridoph. N. Y. 11 (1888). Shortly thereafter Dr. Britton, rightly as it seems to me, discarded the name *I. dubia* for *I. mollis* and published *I. montana* T. & G., var. *mollis* (Gray) Britton in Bull. Torr. Bot. Cl. xvii. (1890).

Ilex montana (including *I. mollis* and *I. monticola*) is a small tree or large shrub of upland woods along the mountains from western New England and the uplands of New York southward. The range and habitat given by Britton is "Mountain woods, New York and Pennsylvania to Georgia and Alabama. Mountain holly." (Ill. Fl. ed. 2, ii. 489); Small (Man. 815), calling it "Mountain Holly," says, "Woods, especially mountain slopes, Blue Ridge and more northern provinces, Ga. and Ala. to N. Y."; Taylor (Fl. Vic. N. Y.) has it "In mountain woods" and cites New Jersey material only from the upland of Sussex and Morris Counties; House (Annot. List N. Y., 480), correctly taking up *I. montana,* says "In mountainous woods"; and so does Porter (Fl. Penn. 203); and the most northeasterly stations for the species are "on the summit of The Dome and about Plantain Pond, Mt. Wash-

[1] Pursh, Fl. Am. Sept. i. 220 (1814).

ington," Berkshire County, Massachusetts (Hoffmann, Fl. Berks. Co. 296). It, therefore, seemed quite improbable that the shrub described by Pursh from "sandy wet woods and on the borders of swamps: New Jersey to Carolina," and thought by him to be the small-leaved *Prinos ambiguus* of Michaux, could have anything to do with the Large-leaved or Mountain Holly, *Ilex montana* Torr. & Gray, of upland woods of the Blue Ridge and the Alleghenies. It seemed evident that, in taking up in place of the clearly typified *I. montana* the wholly indefinite and heretofore unidentified *I. dubia*, Loesener, Mon. Aquifol. (Nov. Act. Abh. k. Leop.-Carol. Deutsch Akad. Naturforscher, lxxviii), 484 (1901) and those who follow him have not understood what Pursh had before him. Since the fullest representation of Pursh's types is in the remarkable collection which had belonged to Benjamin Smith Barton and then to the American Philosophical Society (the collection now deposited at the Academy of Natural Sciences of Philadelphia), I sought there, with the aid of Dr. Pennell and Mr. Long. The species of *Prinos* treated by Pursh, including the type of his *P. laevigatus* (correctly interpreted) are well accounted for by good specimens with Pursh's own labels. There is, however, nothing called by him *P. ambiguus;* but a very full and beautiful sheet in staminate flower (our FIG. 1) bears in his hand an unpublished new name; and in all details, "foliis deciduis ovalibus utrinque acuminatis mucronato-serrulatis subtus pubescentibus, floribus 4 5-fidis, masculis ad imos ramulos congestis," it beautifully checks with the Pursh diagnosis of *P. ambiguus* sensu Pursh, not Michx. That it truly represents what Pursh described, though no fruit is now preserved, there can be no question. The specimen was from the Bartram Garden, the shrubs originally found by Bartram on the Meherrin River, which he crossed above Emporia in Virginia. Dr. Pennell has most kindly allowed me to reproduce a portion of it, × 1, as PLATE 559, FIG. 1. FIG. 2 shows the under surface of a leaf, × 10, to indicate the pubescence; FIG. 3 is from an isotype, × 1, of *Ilex Amelanchier* M. A. Curtis; FIG. 4, the lower surface, × 10, of a leaf of the latter. That they are the same species is evident. Barton presented a small fragment of the Pursh type to Asa Gray. This fragment, without further elucidation than a note by Gray, "Pursh, Hb. Barton" is mounted beside the isotype of *I. Amelanchier* in the Gray Herbarium and it bears the Synoptical Flora revision-slip marked by Trelease "*Ilex Amelanchier.*" Evidently neither Gray nor Trelease recognized its full significance.

Very briefly the tangled nomenclature of *Ilex montana* and of *I. dubia* follows.

Ilex montana Torr. & Gray in Gray, Man. 276 (1848), not *I. montana* (Sw.) Griseb. (1861). *I. ambigua* sensu Torr. Fl. N. Y. ii. 2 (1843), not *Prinos ambiguus* Michx. (1803), source of the name. *Prinos ambiguus* sensu Wood, Class-Book, pt. ii. 243 (1845), not Michx. (1803), obviously, from the description, based on *Ilex ambigua* sensu Torr., although the latter not cited. *I. monticola* Gray, Man. ed. 2: 264 (1856), illegitimate (substitute) name, not *I. monticola* Tul. (1857). *I. Amelanchier* β. *monticola* Wood, Am. Bot. Fl. 208 (1870), obviously, from the description, based on *I. monticola* Gray, although the latter not cited. *I. dubia,* var. *monticola* (Gray) Loesener, Mon. Aquifol. (Nov. Act. Abh. k. Leop.-Carol. Deutsch Akad. Naturforscher, lxxviii), 485 (1901).

Var. mollis (Gray) Britton in Bull. Torr. Bot. Cl. xvii. 313 (1890). *I. mollis* Gray, Man. ed. 5: 306 (1867) as to type (*Lowrie*) and descr., excl. synonyms. *I. dubia* sensu Trelease ex Loesener in Koehne, Deutsche Dendrol. 371 (1893) and in Loesener, Mon. Aquifol. 484 (1901), not *I. dubia* (G. Don) BSP. (1888). *I. monticola mollis* (Gray) Britton in Mem. Torr. Bot. Cl. v. 217 (1894). *I. dubia,* var. *mollis* (Gray) Loesener, l.c. 486 (1901) and var. *mollis* forma *Grayana* Loesener, l. c. 487 (1901).

Var. **Beadlei** (Ashe), comb. nov. *I. Beadlei* Ashe in Bot. Gaz. xxiv. 377 (1897). *I. dubia,* var. *mollis,* forma *Beadlei* (Ashe) Loesener, l. c. 487 (1901). *I. dubia,* var. *Beadlei* (Ashe) Rehder, Man. Cult. Trees and Shrubs, 546 (1927), wrongly ascribed to Loesener.

Var. **macropoda** (Miq.), comb. nov. *I. macropoda* Miq. Prol. Fl. Jap. in Ann. Mus. Bot. Lugd.-Bat. iii. 105 (1867). *I. dubia,* var. *macropoda* (Miq.) Loesener, l. c. 487 (1901).

Var. **hupehensis** (Loesener), comb. nov. *I. dubia,* var. *Hupehensis* Loesener, l. c. 488 (1901).

I. dubia (G. Don) Britton, Stern & Poggenburg, Prelim. Cat. Anthoph. Pteridoph. N. Y. 11 (1888); Trelease ex Loesener in Koehne, Deutsche Dendrol. 371 (1893) as to source of name. *Prinos ambiguus* sensu Pursh, Fl. Am. Sept. i. 220 (1814), not Michx. *P. dubius* G. Don, Gen. Syst. Gard. Bot. ii. 20 (1832), renaming of *P. ambiguus* sensu Pursh, therefore based on the Pursh type. *I. Amelanchier* M. A. Curtis in Chapm. Fl. So. U. S. 270 (1865). *Prinos corymbosus* Pursh "Herb. Barton. mss. ex Sargent," Loesener, Mon. Aquifol. 489 (1901), in synonymy.

The last name, published in synonymy, is similar to but not quite identical with the unpublished trivial "*corymbulosus,*" written by Pursh on the label of his material in Barton's herbarium. As already explained, it is evident that, after writing the diagnosis of his new species under the unpublished name, Pursh (or his editors) dropped

the name and erroneously took up *P. ambiguus* Michx. Thus the doubt and ambiguity started and the name given by George Don to the Pursh plant was almost prophetic in its meaning.

PARTHENOCISSUS QUINQUEFOLIA (L.) Planch., forma **hirsuta** (Donn), comb. nov. *Ampelopsis hirsuta* Donn, Hort. Cantab. 166 (1796), *nomen nudum;* Roem. & Schultes, Syst. v. 321 (1819). *Cissus hederacea*, β. *hirsuta* (Donn) Pursh, Fl. Am. Sept. i. 170 (1814). *Quiniaria hirsuta* (Donn) Raf. Am. Man. Grape Vines, 6 (1830). *Ampelopsis quinquefolia*, β. *hirsuta* (Donn) Torr. & Gray, Fl. i. 245 (1838). *P. quinquefolia*, var. β. *hirsuta* (Donn) Planch. in DC. Monogr. v². 449 (1887), erroneously ascribed to Torr. & Gray. *P. hirsuta* (Donn) Small, Fl. Se. U. S. 758 (1903), not Planch. (1900). *Psedera hirsuta* (Donn) Greene, Leafl. Bot. Obs. i. 220 (1906). *Psedera quinquefolia*, var. *hirsuta* (Donn) Rehder in RHODORA, x. 26 (1908).

Although Donn (who did not describe the plant), Roemer & Schultes (who took their description from Pursh), Rafinesque, Small, Greene and Rydberg (in his Flora of Prairies and Plains) maintain, merely because of some pubescence on the foliage, *Parthenocissus hirsuta* as a species, I agree with the conclusion of the late Eugene P. Bicknell: "as to the pubescent . . . plant there seems little reason to doubt that it is merely a condition of the common Virginia creeper."[1] When he transferred it, as a variety, to *Psedera quinquefolia*, as var. *hirsuta*, Rehder gave it a restricted western range, "from Ontario (Dr. Wm. Macoun, orally) through western New England and along the western slope of the Alleghany mountains through New Mexico to Mexico. In the North this variety very rarely flowers and fruits, which suggests that it is not at home there."[2] My own experience and that of some others who have watched the plants indicates that the pubescent form is most apt to be in shadier and damper habitats than the glabrous and more fruitful plant; and Bicknell, in the place cited, went even further, saying: "The leaves of young plants are often very pubescent, and in older plants the lower leaves may be pubescent and the later ones quite glabrous". Bicknell's notes were made on Nantucket Island where the plant is fertile; flowering or fruiting specimens of it are also before me from Vermont, from Martha's Vineyard, from Connecticut and from New York. These are all from near the northeastern limit of the species, and Nantucket and Martha's Vineyard are as far east as any stations known for the glabrous plant, while material in the Gray Herbarium from Kenesaw Mountain, Georgia,

[1] Bicknell in Bull. Torr. Bot. Cl. xl. 607 (1913).
[2] Rehder in RHODORA, x. 26 (1910).

is from well to the southeast of the "western slope of the Alleghany mountains." In other words, the pubescent plant may occur almost anywhere through the range of the glabrous one.

Parthenocissus quinquefolia is essentially a southern species, common in the southern United States and extending northward to southwestern Maine, southern New Hampshire, Vermont, New York, Indiana, Illinois and Iowa. There is no material of it in the Gray Herbarium from Canada, where it is wholly or chiefly replaced by the northern and western *P. vitacea* (Knerr) Hitchc. All material of the genus which I have seen from Quebec, Prince Edward Island, New Brunswick, Nova Scotia and Ontario belongs to the latter species. It is, therefore, important to consider for a moment the facts that the basic *Hedera quinquefolia* L. Sp. Pl. i. 202 (1753) apparently drew its trivial name from *Edera quinquefolia canadensis*, Cornut, Can. Pl. 99, t. 100 (1635) and that by Linnaeus the species was assigned the unequivocal "*Habitat in* Canada." From this habitat one might infer that the Linnean plant was the Canadian *Parthenocissus vitacea*. It should be borne in mind, however, that Linnaeus gave five other references, including Gronovius (who could have had only the southern species) and that his diagnosis was derived from Mitchell; furthermore, the Cornut plate shows an exaggerated number of adhesive disks on the tendril-branches and his description specially mentions them. It is probable, then, that Cornut's plant was wrongly ascribed a Canadian origin. With the vague geographic concepts of his time Cornut included in his book plants of Spain, Greece, India and other Old or New World areas. Unless his descriptions and illustrations are definitely of known Canadian species it is unsafe to assume that they were based on Canadian plants. The name *Parthenocissus quinquefolia* may safely be left to the species with abundant adhesive disks, paniculately clustered cymes with solitary lower branches, and relatively small fruits.

As to the nomenclatural basis of forma *hirsuta*, Pursh, in first describing it, took up the name used without definition by Donn; so did Roemer & Schultes in publishing *Ampelopsis hirsuta*. Donn's name was thus validated and Donn should be cited parenthetically.

PARTHENOCISSUS VITACEA (Knerr) Hitchc., forma **dubia** (Rehder), comb. nov. *P. hirsuta* Graebner in Gartenfl. xlix. 249 (1900), not *P. hirsuta* (Donn) Small (1903), later homonym—see synonymy above. *P. vitacea*, var. *dubia* Rehder in Mitt. Deutsch. Dendr. Ges. xiv. 135

(1905). *Psedera vitacea*, var. *dubia* (Rehder) Rehder in RHODORA, x. 28 (1908).

VITIS LABRUSCA L., forma **alba** (Prince), comb. nov. Var. *alba* Prince, Treatise on the Vine, 181 (1830).

The form with very pale fruit, either white with amber or russet tone or pinkish.

VITIS RUPESTRIS Scheele, forma **dissecta** (Eggert), comb. nov. Var. *dissecta* Eggert ex Bailey in Gray, Syn. Fl. N. Am. i. 422 (1897).

VITIS RIPARIA Michx., var. **syrticola** (Fernald & Wiegand), comb. nov. *V. vulpina*, var. *syrticola* Fernald & Wiegand in RHODORA, xxv. 212 (1923).

The name *Vitis riparia* Michaux, for the common Riverbank or Frost Grape, with long porrect and acuminate leaf-lobes, small acid fruits with a heavy bloom, and very thin diaphragms at the stem-nodes was correctly applied by DeCandolle, Torrey, Torrey & Gray and Emerson, and by Gray (as a species or as *V. cordifolia*, var. *riparia*) in the first five editions of the *Manual*, by Watson in the 6th edition and by Planchon and numerous other students of our grapes. The name *V. vulpina* L., on the other hand, was as regularly misapplied for many years to the southern *V. rotundifolia* Michx. (the Muscadine).

That the name *Vitis vulpina*, like most Linnean names resting partly on material well known to Linnaeus at first hand, partly on literary references and specimens not so clearly understood by him, does not apply to *V. rotundifolia* everyone is now agreed. In recent years, unjustifiably as it will appear, it has been applied to the northern and almost transcontinental and western *V. riparia* Michx. In June, 1893, Professor L. H. Bailey published a letter from the late Dr. N. L. Britton which included the following item on the Linnean herbarium:

> "*Vitis vulpina*, Linn.—Flowering specimens from the Upsala [Sweden] garden and leaves from Kalm. Planchon correctly refers them to the *V. riparia*, Michx., the type of which is in Michaux' herbarium at Paris, and is correctly understood as the common river-bank grape."[1]

That would seem to be conclusive; and Bailey forthwith regularly reduced *Vitis riparia* Michx. to *V. vulpina* L., in Gray's Synoptical Flora and elsewhere. But in 1898 Bailey wrote:

"Since that time, however, I have myself examined Linnaeus' specimens in London, and find that he had specimens of two species under the name of vulpina. On one sheet are two leaves, one marked *V. vinifera*

[1] Britton as quoted by Bailey in Am. Gard. xiv. 353 (June, 1893).

and the other *V. vulpina*, both in Linnaeus' hand. The former is the wine-grape (*V. vinifera*), and the latter is the river-bank grape (*V. riparia*). Another herbarium sheet, however, has a large flowering specimen, labelled, in Linnaeus' hand, *V. vulpina*, and this is the frost-grape (*V. cordifolia*). It would have been better to have taken this latter specimen as Linnaeus' type, and to have made the name vulpina supplant cordifolia; but since the other disposition has been made of the case, I shall not make the change."[1]

In March, 1934, Bailey quoted his statement just given and added:

"My opinion still holds that the specimen represents the winter grape (*V. cordifolia*) although a new examination of the specimen itself might afford additional clues. . . The Linnaean sheet identified as *cordifolia* is inscribed by Linnaeus with the name *vulpina* and the numeral 4 that refers to the entry in Species Plantarum. Rules of nomenclature adopted since the foregoing publications require, on the face of the record, that *vulpina* supplant *cordifolia*, in which case *riparia* comes up for the plant now known as *vulpina* or frost grape; the net gain would be confusion. But the case is not as simple as this.

As one looks at the Linnaean account in Species Plantarum one is struck by the fact that *Vitis vulpina* is not described, but is attended with the phrase "foliis cordatis dentato-serratis utrinque nudis"; then is cited "Vitis vulpina dicta virginiana nigra" from Plukenet, Almagestum, 1696; apparently Linnaeus took the name *vulpina* from Plukenet. The Latin line precludes *V. Labrusca*, *aestivalis*, and its relatives, and it leaves only the frost grape and winter grape and the muscadine among Virginian species to qualify for the name. Linnaeus cites no collector; yet the sheet bears the letter K which means Kalm, who collected in Canada, New York, New Jersey and Pennsylvania, whereas Linnaeus ascribes vulpina to Virginia (and he would hardly have used the term "Virginia" as broadly as to include New Jersey and Pennsylvania), and also H. U. which means the garden or hortus at Upsala. The word *fox* (*vulpina*) does not aid us in identifying the Plukenet grape for at that time it may have been applied to more than one species and not alone to *V. Labrusca* as at present as, indeed, is done by Plukenet himself; in fact, the muscadine (*V. rotundifolia*) was once known as fox grape.[2]

The Linnaean sheet bears two specimens, the lower one of three leaves apparently from the wild and collected by Kalm, the upper one of three[3] leaves and two flower-clusters being grown at Upsala from Kalm seeds. The Linnaean sheet of *Vitis Labrusca* is also marked with a K, showing that Peter Kalm collected it; and in this case, as we have seen, the species is supported by the picture (Fig. 98) in Plukenet, but we have no cited figure back of *V. vulpina*.

It is apparent that Linnaeus meant to designate two American grapes, one species (*Labrusca*) with tomentose leaves, and the other (*vulpina*) with naked leaves. We have noted (page 186) that his *Labrusca* appar-

[1] Bailey, Evolution of Our Native Fruits, 103 (1898).

[2] In July, botanizing with two experienced amateurs of Norfolk, Virginia, we came to *V. vulpina* (*V. cordifolia*) on the outermost coast of Virginia (Back Bay). Looking at it they immediately exclaimed "Fox Grape!"—M. L. F.

[3] The photograph shows only 2.

Photo. W. H. Hodge

ILEX DUBIA: FIG. 1, TYPE, × 1 (courtesy of Dr. FRANCIS W. PENNELL); FIG. 2, lower surface of leaf, × 10; FIG. 3, leaf, × 1, from ISOTYPE of *I. Amelanchier;* FIG. 4, lower surface of leaf shown in FIG. 3, × 10.

Type-sheet of VITIS VULPINA, × ½ (courtesy of Mr. S. SAVAGE)

ently included *aestivalis*, and his *vulpina* is undoubtedly also to be considered an aggregate species and one therefore has considerable latitude in interpretation of it. If there is extant an authentic Plukenet specimen of his "Virginian nigra" it might either change the application of *V. vulpina* or eliminate it as a *nomen confusum*.[1]

In view of the simple facts, that in preparing *Species Plantarum* Linnaeus had in his own herbarium and himself labeled two sheets bearing what he called *Vitis vulpina* and described the fuller of them in the very typical Linnean diagnosis (although Bailey says "not described"), the earlier references are wholly secondary in a nomenclature which avowedly and actually begins with 1753. Obviously, as Professor Bailey correctly concluded, the full sheet bearing above a flowering branch from the Upsala garden ("H.U." below the specimen indicating Hortus Upsaliensis) should stand as the type of *V. vulpina*. Plate 560 shows this sheet, × ½, and probably every botanist who knows the southern *V. cordifolia* will agree with Bailey that the type of *V. vulpina* L. is *V. cordifolia* Michx. Bailey protests the ascription by Linnaeus of a plant supposedly originating from Kalm's collections to Virginia; but when Linnaeus got a *Potentilla* from Hudson Bay and named it *P. pensylvanica* and a *Berberis* from the South and called it *B. canadensis*, it is evident that he had no clearer conception of American geography than do most present-day European botanists and little appreciation of the geographic significances of the names he repeatedly used; it sometimes seems as if he had a small series and used at random such trivials as *canadensis*, *marilandica*, *pensylvanica* and *virginiana*. At any rate, Kalm spent much time within the range of true *V. vulpina* (*V. cordifolia*), which occurs in northern Delaware, southern New Jersey and eastern Pennsylvania. It would have been very difficult for him not to see it.

Although Bailey has said that from a correction of the error to which he clings "the net gain would be confusion," it can not be overlooked that the confusion would be only temporary and that long prior to his misapplying the name *Vitis vulpina* L. to *V. riparia* Michx., instead of to *V. cordifolia* Michx., the Linnean name had been correctly used for *V. cordifolia* by several early botanists: by Muhlenberg[2] who definitely reduced *V. cordifolia* to its synonymy; by Torrey, who did the same[3]; by Beck, Le Conte and several others. In fact, if there

[1] Bailey, Gent. Herb. iii. fasc. iv. 236 (1934).
[2] Muhl. Cat. 27 (1813).
[3] Torr. Fl. N. Mid. U. S. 264 (1824).

were any question about the identity of *V. vulpina* and *V. cordifolia* it was very clearly settled by the distinguished botanist who bought the Linnean collections and established them in London. In 1819 Sir James Edward Smith, treating *Vitis* in Rees' Cyclopedia (xxxvii.) correctly applied the name *V. riparia* Michx. to the "Sweet-scented Vine," with "leaves unequally and deeply toothed, slightly three-lobed." He also correctly described *V. vulpina* L., with the synonym *V. cordifolia* Michx., the "Winter Grape, or Chicken Grape"; and, from his study of the Linnean material which he had purchased, explicitly said: "This is certainly the *vulpina* of Linnaeus, and consequently of Willdenow, though Pursh cites the latter author under the foregoing species [*V. aestivalis*]. The *leaves* of the present have but a slight indication of a lobe at each side, and are more oblong and pointed than either of the two last [*V. Labrusca* and *V. aestivalis*]; being moreover quite smooth, from the earliest period, except the little axillary tufts of hair on the under side."[1] See PL. 560.

Sir James Edward Smith and several others of his time had the identities correct and Smith's correct typification of 1819 antedates the erroneous one by three-fourths of a century. By our rules of nomenclature (I do not get the full significance of Bailey's reference to "Rules of nomenclature adopted since the foregoing publication") Smith's typification, having no flaw in it, properly stands. The present-day temporary confusion is wholly secondary to the correct typification established 120 years ago!

VITIS ARANEOSA Le Conte.—In 1853 John Le Conte published as new species of the southeastern states four members of *Vitis*. One of them, *V. araneosa* Le Conte in Proc. Acad. Philad. 1852-53: 272 (1853), seemed, in its "berries of a middling size, .5 of an inch in diameter, black," so distinct from ordinary *V. aestivalis* Michx. to which Bailey (Gent. Herb. iii.[4] 154) reduces it and which he describes as having "berries . . . with medium to thick bloom," that I took to Philadelphia a representative series of the rufescent-leaved species for comparison with it. Le Conte's account was as follows:

[1] At the Aberdeen meeting of the British Association in September, 1885, Radlkofer thus referred to Smith's elucidation of the Linnean species: "As far as the Linnean Herbarium is concerned, Sir Edward Smith in his day endeavoured to extract therefrom a correct conception of the Linnean species; but the slender scientific means of his time enabled him to arrive at the goal in only a few instances. Nevertheless his contributions to Rees's 'Cyclopaedia' on this subject are of great value, and deserve republication in a collective form, in order to make them generally available."—Radlkofer in Rep. Fifty-first Meeting Brit. Assoc. Adv. Sci. 1080 (1886).

6. V. ARANEOSUS. Foliis lato-cordatis, sublobato-angulatis, integris, trilobis aut quinquelobis, lobis acuminatis, dentatis, dentibus submucronatis, supra glabris, subtus arachnoideo-villosis, villositate plus minus ferruginea. Racemis subdensis, baccis maioribus nigris.

Hab.—In the upper parts of Georgia. Vulg. Fox grape.

Stem moderately large and high. Leaves broad, cordate, sublobately angled, entire and three or five-lobed, acuminate dentate; the teeth submucronate, above glabrous, beneath arachnoideo-villous, more or less ferruginous; in the older leaves this villosity forms into small tufts or knots, and in the very oldest almost entirely vanishes, although in the youngest it is very thick and close. Racemes dense; berries of a middling size, .5 of an inch in diameter, black, often very sweet and agreeable. The leaves are sometimes 8 inches long and as many wide.

The species is well worth cultivating.

Whereas three of Le Conte's four newly proposed species were from New Jersey, from "Carolina and Georgia in swamps," and from "Virginia and Maryland," respectively, *Vitis araneosa*, with black berries half-an-inch in diameter, came from "the upper parts of Georgia," where it is called "Fox grape." One of the several folders of loose leaves and branchlets in the Le Conte series contains small and medium-sized leaves as described by Le Conte and at least one to support the "sometimes 8 inches long and as many wide" of his account. This folder has the accompanying label:

(3) From Dr. Ware's gardens at Athens [upper Georgia], Sept. 14th, 1850. Supposed to be the Wild Fox or Winter Grape. Fruit in very compact bunches or clusters; tolerably pleasant to the taste; not very sour. Color = black. Size = [a circle ½ in. across].

That this sheaf of specimens, the only ones from upper Georgia and closely matching the original account of *Vitis araneosa*, should be accepted as the type-material of that species there seems no reasonable doubt. It is, therefore, significant that it is closely matched by an isotype of *V. rufotomentosa* Small, Fl. Se. U. S. 756, 1334 (1903) and quite as well by material from upper Georgia (Kenesaw Mt., *Perry & Myers*, no. 935) which Professor Bailey has correctly marked *V. rufotomentosa*. The latter species, originally described by Small with "berries black, with little or no bloom," is, it seems to me, inseparable from *V. araneosa* Le Conte (1853) and must take the latter name, *V. araneosa* Miquel from Sumatra dating from 1860, *V. araneosa* Dalz. & Gibs. of India from 1861.

SPHAERALCEA **angusta** (Gray), comb. nov. *Malvastrum angustum* Gray in Mem. Am. Acad. n. s. iv[1]. (Pl. Fendl.), 22 (1849).

It is with great hesitation that I make a transfer in the complex and

quite unsettled group of *Sphaeralcea*, including *Malvastrum*. I follow Kearney in his *North American Species of Sphaeralcea Subgenus Eusphaeralcea* (Univ. Calif. Pub. Bot. xix[1]. (1935)) in uniting *Malvastrum*, typified by *M. coccineum* (Pursh) Gray, with *Sphaeralcea*. Rydberg has proposed *Sphaeralcea angusta* (*Malvastrum angustum* Gray) as a monotypic genus, *Sidopsis* Rydb. Fl. Pr. Pl. Centr. N. Am. 541 (1932). Unfortunately, however, the only species, with the stated range "Tenn.—Iowa—Kans.," was given the specific name "*S. hispida* (Ell.) Rydb.," based upon *Sida hispida* Ell. If Elliott be looked up it will be found that in his Sketch of the Botany of South-Carolina and Georgia, i. 159 (1821) he correctly assigned the name *Sida hispida* to Pursh, Fl. Am. Sept. ii. 452 (1814), where it was originally published for a plant of "sandy plains in Georgia" seen by him in Herb. Lyon. Whether or not Elliott's plant from South Carolina or Georgia was the same as the plant Pursh saw in Lyon's herbarium is not known. The range of his *Sidopsis hispida*, given by Rydberg, explicitly excludes the regions of both Pursh's and Elliott's plants. The plant occurring from western "Tenn.—Iowa—Kans." was listed from St. Louis (*Drummond*) by Hooker, Journ. Bot. i. 198 (1834), but whether it is what Pursh and Elliott had is open to serious question. In publishing his *Malvastrum angustum* Gray cited "Sida hispida, *Pursh, Fl.* 2. *p.* 452? *Hook.! Jour. Bot.* 1. *p.* 198" and continued: "This is probably Pursh's plant; but I have not seen it from Georgia. Drummond gathered it at St. Louis." In his latest statement, under *Malvastrum angustum*, Gray gave the synonymy: "*Sida hispida* Hook. Journ. Bot. i. 198, perhaps Ell. Sk. ii. 159, hardly Pursh, Fl. ii. 452."[1]

In view of the complete doubt about the identity of *Sida hispida* Pursh, which antedated Elliott by seven years and which was presumed by the latter author to be his plant, it is quite unwise to force upon the plant of dry barrens and hills of the Mississippi basin the name of an unidentified plant of Georgia and possibly South Carolina. I am, therefore, retaining for the plant of the Mississippi basin the first name which unquestionably belongs to it. If and when Pursh's type is found and positively identified with *Sphaeralcea angusta* Pursh's name will be justified; at present its use would be too questionable.

Passiflora lutea L., var. **glabriflora**, var. nov., calicis tubo glaberrimo: caulibus glabris vel rarissime pilosis; foliis glabris.—

[1] Gray, Syn. Fl. N. Am. i[1]. 308 (1897).

Southern Ohio to Missouri, south to Tennessee, Arkansas and Texas. TYPE: base of cliff between Sugar Loaf and Falling Spring, St. Clair County, Illinois, October 5, 1918, *J. M. Greenman*, no. 3926.

All material in the Gray Herbarium from Ohio, Indiana, Kentucky, Tennessee, Illinois, Missouri, Arkansas, Oklahoma and Texas has the calyx and leaves quite glabrous and all but two sheets (from Texas) have the stems glabrous. Contrasted with this glabrous extreme in the interior of the country is the series from the Atlantic Slope. All specimens from eastern Pennsylvania, Delaware, Virginia, North Carolina, South Carolina, Georgia and Florida, which are in condition to show them, have the calyx-tubes pilose or hirsute. The stems, especially when young, are more or less pilose-hispid, in many plants abundantly and permanently so, in others with the pilosity disappearing in age. Since the type came from Virginia the plant with pilose calyx-tube must be treated as typical.

HYDROCOTYLE VERTICILLATA Thunb., var. **triradiata** (A. Richard), comb. nov. *H. tribotrys* Ruiz & Pavon, Fl. Peruv. iii. 24, t. 246, fig. *b* (1802). *H. polystachya* A. Richard, var. α *Triradiata* A. Richard in Ann. Gen. Sci. Phys. iv. 171 (repr. as Monogr. Gen. Hydrocotyle, 51) (1820). *H. racemosa* Moc. & Sessé ex DC. Prodr. iv. 70 (1830). *H. bonariensis* Lam., var. *tribotrys* (Ruiz & Pavon) G. Don, Gen. Hist. Dich. Pl. iii. 249 (1834). *H. prolifera* Kellogg, Proc. Calif. Acad. Sci. i. 15 (1854) and ed. 2, i. 14 (1873), not Otto (1839). *H. natans* Torr. Bot. Mex. Bound. 69 (1859). *H. umbellata* L., var. (?) *ambigua* Gray, Man. ed. 5: 190 (1867). *H. verticillata*, vars. *tenella*, *13-nervis*, *longipedunculata* and *pluriradiata* Urban in Mart. Fl. Bras. xi[1]. 268 (1879). *H. Canbyi* Coult. & Rose in Bot. Gaz. xii. 103, t. 4 (1887). *H. ambigua* (Gray) BSP. Prelim. Cat. N. Y. 21 (1888), not Pursh (1814). *H. australis* Coult. & Rose in Contrib. U. S. Nat. Herb. vii. 28 (1900).

I fully concur with Dr. Mathias in Brittonia, ii. 204 and 240 (1936) in feeling that the plant known in current manuals as *Hydrocotyle Canbyi* is separable from *H. verticillata* only through its pedicelled flowers and fruits. The synonymy given above is drawn from her papers. But, following the International Rules of Botanical Nomenclature, it becomes unfortunately necessary to add another to the many names under which the plant has been somewhat misinterpreted. Art. 55 reads, in part:

When a variety or other subdivision of a species is transferred, without change of rank, to another genus or species (or placed under another generic or specific name for the same genus or species), the original subdivisional epithet must be retained or (if it has not been retained) must be re-established.

Treated as a variety, the plant under discussion should take the varietal name *triradiata*, the first trivial name given to it (by Achille Richard in 1820) as a variety. Instead, Dr. Mathias uses for it, as a variety, the first trivial name given to it as a species. In her treatment she indicates doubt as to the identity of *H. tribotrys* and of *H. polystachya* var. *triradiata* which was based upon it; but she expresses no doubt about the identity of *H. bonariensis* var. *tribotrys*, which was a mere nomenclatural transfer by George Don of *H. tribotrys* to varietal rank. Dr. Mathias explains her doubt as to the first two names, based on the same type, as follows:

> The type specimen of *H. tribotrys* R. & P. has not been seen and the plant in the Madrid Herbarium so named is obviously mislabeled since the leaves are non-peltate. This specimen has been referred to *H. alchemilloides*. The plant illustrated and described as *H. tribotrys* by Ruiz & Pavon apparently belongs to this variety.

The fact that someone, during more than a century, mislabeled as *H. tribotrys* a plant which is quite unlike that described and illustrated by Ruiz & Pavon does not alter the identity of the plant they so clearly described "foliis peltatis subrotundo-reniformibus . . . Flosculi in verticillos remotos, quinquefloros, . . . breviter pedunculati," and so beautifully illustrated. Dr. Mathias has no doubt that the plant illustrated and described was the ramose extreme of our *H. Canbyi;* neither have I. The Ruiz & Pavon description and plate were of the large extreme with trifurcate inflorescences; and they are readily matched by various specimens from as far north as Cape Charles ("Cape Charles, Maryland" [Virginia], *Tidestrom*, no. 11,615; Lake Worth, Florida, *A. H. Curtiss*, no. 5676; Georgetown, Texas, *Edw. Palmer*, no. 383 [or ?353]; Devil's River, Texas, *Havard*, no. 139; etc.). Since *H. polystachya* var. *triradiata* (1820) and *H. bonariensis* var. *tribotrys* (1834) were both based exclusively on the Ruiz & Pavon description and plate, Richard preferring to give a slightly better name, the doubt indicated regarding the former would apply equally to the latter. I do not feel that there is appreciable doubt.

In the Gray Herbarium Dr. Mathias, in 1935, placed revision-labels indicating for *H. verticillata* var. *triradiata* a varietal combination different from the one she later published. The unpublished combination, based upon *H. prolifera* Kellogg (1854), doubtless occurs in other herbaria. Care should be taken to guard against its inadvertent publication.

Cicuta maculata L., var. **Curtissii** (Coult. & Rose), comb. nov. *C. curtissii* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. no. 1—Mon. N. Am. Umbelliferae, 97 (1900).

Coulter & Rose separated the southern Coastal Plain *Cicuta Curtissii* from the northern and wide-ranging inland *C. maculata* by "root-stock much thicker; leaflets thickish, conspicuously reticulate beneath; fruit orbicular, 2 mm. long, constricted at the commisure; ribs approximately equal in surface display; the laterals largest in section, but not wedge-shaped or closely contiguous; dorsal and intermediate ribs about as broad as the intervals; oil tubes large." The type cited was *Curtiss* no. 1030 from Duval County, Florida; and the range was given as "From southern Virginia and southeastern Kentucky to Florida and Louisiana." Since their *C. Curtissii* had previously been confused with *C. maculata,* their definition of the latter becomes important; "leaflets rather thin, from narrowly lanceolate to oblong-lanceolate, . . . coarsely and sharply serrate, . . . reticulation indistinct; fruit oblong, 4 mm. long, not constricted at the commissure," etc. In brief, as shown by the type number and by much other material from stations north to Virginia, the leaflets of *C. Curtissii* are oblong-lanceolate to lance-ovate, with the secondary veins prominent beneath, the margins coarsely crenate to serrate-dentate with broad-based semi-ovate teeth, the larger leaflets of the lower (ternately decompound) leaves 2.5–5.5 cm. broad; fruits nearly round, 2–3 mm. long, the marginal ribs separated by a clearly defined dark furrow.

Cicuta maculata, as left by Coulter & Rose, when they separated off their *C. Curtissi,* is of wide range from the Gaspé Peninsula, Quebec to eastern Manitoba, south across the northern states to the uplands of North Carolina, and Tennessee, Missouri and Oklahoma. Its thin leaflets are narrowly to broadly lanceolate or lance-oblong, with the secondary veins less prominent beneath as compared with *C. Curtissii,* the margins sharply serrate with prolonged lanceolate teeth, the larger leaflets 0.5–3 cm. broad; fruits ellipsoid or ovoid, 2.5–4 mm. long, the marginal ribs confluent until maturity, without a dark intermediate furrow.

If the two series would stay within these bounds there would be no question of their specific distinctness; but, unfortunately, it is not difficult to find quite reniform-globose fruits with the marginal ribs wholly confluent but with the thin and slender-toothed leaflets in the

North, while many otherwise typical specimens of *C. Curtissii* from the South have a few fruits with confluent marginal ribs mixed with the more typical fruits in the same umbel. In fact, Coulter & Rose themselves threw a doubt on the specific distinctness of *C. Curtissii*. They cited the 11 sheets of typical *C. Curtissii* which they had seen; but under *C. maculata* cited 9 others which were atypical of the latter species, "the leaves . . . thicker and strongly reticulated, as in *C. curtissii*, the two types of fruit are represented—one with very broad corky ribs and narrow intervals, the other with ribs and intervals as in *C. maculata* but with fruit almost orbicular." Small, likewise, maintaining the two as species, *C. maculata* with "typically" oval or ovoid fruits, *C. Curtissii* with them "typically" subglobose or reniform-globose, referred to globose-fruited northern specimens with the foliage and confluent marginal ribs of *C. maculata* as "sporadic" *C. Curtissii* "as far North as Nova Scotia" (Man. 975). In short, Coulter & Rose found the characters used to separate the two extremes not constant; neither did Small; neither do I.

Cicuta maculata, until Coulter & Rose's separation from it of *C. Curtissii*, was treated as an unvarying species, except for var. *angustifolia* Hook. Fl. Bor.-Am. i. 259 (1834) from the Saskatchewan, a plant very inadequately described but probably belonging to the western *C. occidentalis* Greene. In originally publishing *Cicuta maculata* L. Sp. Pl. i. 256 (1753) Linnaeus had in mind both the thin-leaved plant with slender teeth and *C. Curtissii*. He gave an original diagnosis based on the plant in his own herbarium, with "serraturis mucronatis." This was a specimen from Kalm and the photograph of it, kindly supplied by Mr. Savage, well shows the common northern thin-leaved extreme with lance-attenuate slender-toothed leaflets. After his own diagnosis Linnaeus cited *Aegopodium foliolis lanceolatis* of Gronovius; then he gave a reference to a Plukenet figure, and last (also least, in importance) a reference to Morison. Plukenet's figure is of *C. maculata*, as left by Coulter & Rose, after they removed *C. Curtissii;* but, to give an element of confusion to the matter, the Clayton plant on which Gronovius based his *Aegopodium foliolis lanceolatis* was, as shown by the beautiful photograph supplied by Mr. Ramsbottom, very characteristic *C. Curtissii*. This, in view of the fact that Linnaeus included both extremes, would be of only secondary interest had not Coulter & Rose specially designated the Clayton specimen as typical of *C. maculata:* "Type locality. 'in Virginiae aquosis'; collected by Clayton."

Photo. W. H. Hodge

CICUTA VICTORINII: FIG. 1, TYPE, × ½; FIG. 2, fruits, × 10.
C. MACULATA: FIG. 3, fruits, × 10.

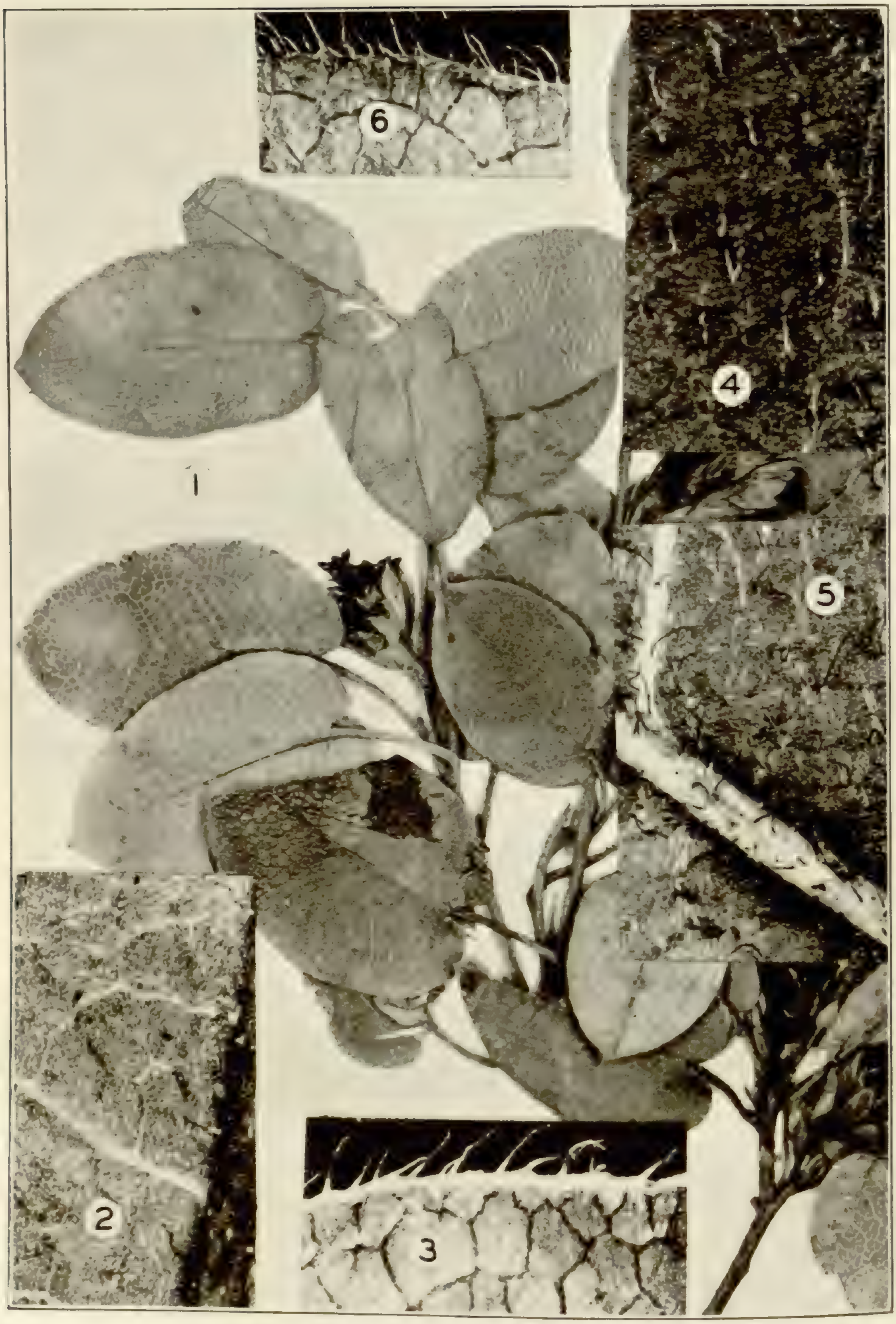

Photo. W. H. Hodge

EPIGAEA REPENS: FIG. 4, upper surface of mature leaf, × 10; FIG. 5, lower surface, × 10; FIG. 6, ciliation, × 10.

Var. GLABRIFOLIA: FIG. 1, portion of TYPE, × 1; FIG. 2, lower surface of leaf, × 10; FIG. 3, ciliation, × 10.

In view, however, of the facts that neither Coulter nor Rose had seen the specimens studied by Linnaeus and that their definition of *C. maculata* accords with the specimen in the Linnean Herbarium, not with that of Clayton, I am taking as the type of *C. maculata* the former specimen. Surely Coulter & Rose did not understand the specimens, for they certainly would not have set up *C. Curtissii* as a new species (which abounds in eastern Virginia) and immediately have intentionally designated as type of the Linnean species a characteristic specimen of their proposed new species. By holding to the specimen which Linnaeus himself had prior to 1753 confusion is avoided.

CICUTA **Victorinii**, sp. nov. (TAB. 561), planta perennis radicis tuberoso-carnosis; caulibus 3–6 dm. altis; foliis biternatis, segmentis lineari-lanceolatis 1.5–4 cm. longis dentato-serratis; umbellis 3–8 cm. latis; fructibus reniformibus vel cordato-ovoideis, 3.5–4 mm. longis, costis lateralibus prominentibus aliis obscuris.—Tidal flats of the St. Lawrence River, QUEBEC: grèves intercotidales, Cap Rouge près du Pont de Québec, 9 août 1922, *Victorin*, no. 15,479 (TYPE in Herb. Gray, ISOTYPES in Herb. Univ. Montréal and in Herb. Victorin); grèves intercotidales, St. Laurent de l'Ile d'Orleans, 16 août 1922, *Victorin*, no. 15,480 (in same herbaria).

In its reniform or cordate-ovoid fruits with all the ribs obscure except for the 2 laterals *Cicuta Victorinii* is very distinct. Its very narrow and relatively few leaf-segments are also distinctive. In the wide-ranging and coarse *C. maculata* L., the common species of eastern North America, the ellipsoid or ovoid fruits (FIG. 3) have alternating rounded ribs and dark furrows, usually with the marginal ribs confluent until maturity. *C. Victorinii*, collected only by Brother Victorin, is another of the notable species restricted to the estuary of the St. Lawrence.

In PLATE 561, FIG. 1 shows a plant, × ½, of the TYPE-COLLECTION; FIG. 2, a group of fruits, × 10.[1] FIG. 3 is a group of mature fruits, × 10, of *C. maculata* from Bridgewater, Nova Scotia, *Fernald & Long*, no. 24,249.

ZIZIA **aptera** (Gray), comb. nov. *Thaspium trifoliatum* (L.) Gray, var. *apterum* Gray, Man. ed. 2: 156 (1856).

Zizia aptera is the transcontinental plant which regularly passes as *Z. cordata* (Walt.) Koch in DC. Prodr. iv. 100 (1830). The name *Z.*

[1] The umbellets all show the result of being twice-a-day submerged, their pedicels being enmeshed with extraneous matter.

cordata rests upon *Smyrnium cordatum* Walt. Fl. Carol. 114 (1788); but, unfortunately, it must be abandoned for the species of *Zizia* for two reasons. In the first place *Smyrnium cordatum* was an illegitimate name given by Walter as a substitute for *Thapsia trifoliata* L. Sp. Pl. i. 262 (1753). Nomenclaturally *Smyrnium cordatum* is the same as *Thapsia trifoliata;* it could not properly be the basis of a combination under *Zizia* because the type of *Thapsia trifoliata* is well known to be a member of *Thaspium.* Blake, examining the type of the latter, reported[1] that it is the eastern plant described as *Smyrnium atropurpureum* Desr.; Gray, many years earlier, in a detailed manuscript on the Linnean Herbarium, recorded "*Thapsia trifoliata* = *S. atropurp.*"; and the sheet in the Linnean Herbarium, bearing in the hand of Linnaeus "*trifoliatum,*" shows, through the photograph supplied by Mr. Savage, that the identifications of Gray and, later, of Blake are not to be questioned. Although Gray, in 1856, had not cleared the two generic elements, *Thaspium* and *Zizia,* he did understand the identities of the two plants in question. In edition 2 of the Manual, l. c., he took up as an aggregate species *Thaspium trifoliatum,* with two varieties: var. *atropurpureum* with the correct synonymy "Thápsia trifoliata, *L.* Smyrnium cordatum, *Walt.* Thaspium atropurpureum, *Nutt.*"; and the new "Var. **ápterum.** Petals yellow: fruit with sharp ribs in place of wings. (Zizia cordata, *Koch, Torr.*)" In other words, Gray correctly distinguished *Zizia cordata,* as understood by Koch and by Torrey (sensu Koch and Torrey), from *Smyrnium cordatum* Walt., which he knew to be based upon and identical with *Thapsia trifoliata* L.; but, as already indicated, since Walter had substituted for the Linnean *Thapsia trifoliata* his new name *Smyrnium cordatum,* his specific epithet cannot be made the basis of a combination in another genus.

Even if it be argued by those (if there are any) who think with Farwell[2] that the citation by an author, when he publishes a new name with a diagnosis, of a previously published name does not mean that he intended the two as synonymous, the fact remains that the only one of the two plants, *Thaspium trifoliatum* and *Zizia aptera,* known in Walter's territory is the former. This (typical *T. trifoliatum,* with umbels only 1.5–3(–4) cm. broad, the greenish to purple flowers all stalked and the rounded-ellipsoid fruits with broad dorsal wings) is

[1] See Blake, Rhodora, xx. 52 (1918).
[2] Farwell, Mich. Acad. Sci. Rep. xxi. 368 (1920) and Rhodora, xli. 80 (1939).

generally dispersed in the region known to Walter. *Zizia aptera*, a true *Zizia* with the central flower and fruit of the umbellet sessile, the fruits with filiform ribs, and in *Z. aptera* the flowers yellow, is not known in Walter's territory. The only specimens of it seen by Coulter & Rose from the Atlantic states south of the Potomac were from Asheville, North Carolina. Collections, mostly since the time of Coulter & Rose, show it to be in the upland and piedmont regions of Virginia and northern North Carolina, thence along the mountains to Georgia. I have seen no material of it from Walter's region of southeastern South Carolina.

In connection with the taking up for the transcontinental *Zizia* of the name *aptera*, based upon an old varietal name, it is necessary to note *Z. sylvatica* Benke in RHODORA, XXXV. 45 (1933). Its author distinguished *Z. sylvatica* from "*Z. cordata* (Walt.) DC." as follows:

"*c.* Cauline leaves all divided; rays of umbel rather as in *Z. aurea;* plants mostly of open ground.....*Z. cordata* (Walt.) DC.
c. One or more cauline leaves undivided; other leaves and umbel rather as in *Z. Bebbii;* plants of shaded woods .....*Z. sylvatica.*"

The type of *Zizia sylvatica* was from Tunnel Hill, Johnson County, Illinois, *Benke*, no. 5252. A beautiful sheet of the type collection, most kindly sent to the Gray Herbarium, shows the young fruits with the definite wings of *Thaspium*. In its upper trifoliolate leaves it is quite inseparable from characteristic material of *T. trifoliatum*, var. *flavum* Blake, the inequilaterally round-based and long-acuminate leaflets closely matched in the type of var. *flavum* and in many other specimens from woodlands and bottoms of West Virginia, Ohio, southern Michigan, Indiana, Kentucky, Tennessee, Illinois, Missouri and Arkansas. Although trifoliolate cauline leaves are more common in the typical *Thaspium trifoliatum* than in its generally more inland var. *flavum*,[1] simple ovate cauline leaves sometimes occur in each of them and occasionally nearly all (4 out of 5) of the cauline leaves of the former may be simple. I can find nothing to separate the isotype of *Zizia sylvatica* from *Thaspium trifoliatum*, var. *flavum*. Mr. Benke states that the cauline leaves of *Zizia aptera* (*Z. cordata* of authors) are "all divided."

[1] *Thaspium trifoliatum* is above defined. Var. *flavum* Blake in RHODORA, XX. 53 (1918), extending inland to Minnesota and south to Alabama and Arkansas, differs in its generally greater size, coarser and more knotty rhizome, simple basal leaves (when present) 3–10 cm. long (in typical *T. trifoliatum* 1.5–5 cm.); cauline leaves at 1st fork of stem with terminal leaflet 3–8 cm. long (as opposed to 2–4.5); umbel 3–9 cm. broad (as opposed to 1.5–4); petals yellow; and fruit 4–5 (instead of 3–4) mm. long.

In the rather small representation of it in the Gray Herbarium, however, 1 or more simple cauline leaves are shown in 26 specimens (Staten Island, New York, *N. L. Britton;* Allegany State Park, New York, *Alexander & House,* no. 13112; Normansville, New York, *Burnham;* Mt. Cuba, Delaware, *Baker, Market & Goodale,* no. 53893; Long Mt., Frederick County, Virginia, *Griscom & Hunnewell,* no. 18782; Weldon, North Carolina, *E. B. Bartram;* and 20 numbers westward to the Pacific slope.

The type of *Thaspium trifoliatum,* var. *apterum* Gray, therefore of *Zizia aptera,* is the only sheet so marked by Asa Gray in the Gray Herbarium at the time of publishing the variety: a sheet in good fruit from "New York & New Jersey." Throughout most of its range *Z. aptera* has the subcoriaceous leaflets of the upper leaves closely and finely toothed. In the northwestern area of its occurrence, however, the leaves become membranaceous and the leaflets of the upper cauline ones are lacerate or coarsely jagged-toothed. This extreme I am calling

Z. APTERA, var. **occidentalis**, var. nov., foliis membranaceis; foliorum superiorum foliolis laceratis.—IDAHO: Soda Springs, June 21, 1892, *Mulford;* west side Sautianne Divide, Coeur d'Alene Mts., June 23, 1895, *Leiberg,* no. 1018. UTAH: swampy ground, Goodman's Ranch, near Bear River, Summit County, July 12, 1926, *E. B. & L. B. Payson,* no. 4957. OREGON: Sauvies Island, June, 1877, *Howell;* wet soil of Wallowa River, 3800 feet alt., June 11 and July 20, 1900, *Cusick,* no. 2401 (TYPE in Gray Herb.). WASHINGTON: meadows, Crab Creek country, June 13, 1884 and Spokane County, June 27, 1884, *Suksdorf,* no. 316; Pullman, July 24, 1893, *Piper,* nos. 1557, 1559; low meadows between Tonasket and Republic, Okanogan County, June 29, 1931, *J. W. Thompson,* no. 7120.

ZIZIA AUREA (L.) Koch, forma **obtusifolia** (Bissell), comb. nov. *Z. aurea,* var. *obtusifolia* Bissell in RHODORA, ii. 225 (1900).

EPIGAEA REPENS L.—To one familiar with *Epigaea repens* in Newfoundland, Canada and the northern states the plant of eastern Virginia seems surprisingly scabrous to touch; and study of the more than 300 collections in the Gray Herbarium and the herbarium of the New England Botanical Club shows that there are two well defined geographic varieties: (1) the southern extreme (FIGS. 4–6), with the over-wintered leaves scabrous on both surfaces with persistent, dark (becoming blackish) stiff hairs; (2) the northern extreme (FIGS. 1–3), with the lower old leaf-surface glabrous and nearly or quite smooth to touch (except sometimes for the hairy midrib), the upper surface

glabrous or promptly glabrate. The occurrence (number of specimens studied) of these two varieties by states and provinces is indicated in the accompanying table, the numbers (1 and 2) indicating the varieties as above defined.

	Var. 1	Var. 2		Var. 1	Var. 2
Newfoundland	0	11	Long Island	2	0
Quebec	0	19	New Jersey	5	0
Prince Edward Island	0	3	Pennsylvania	4	3
New Brunswick	0	2	West Virginia	1	2
Nova Scotia	0	7	Virginia	10	2
Ontario	0	5	North Carolina	3	2
Maine	0	56	Georgia	2	0
New Hampshire	0	54	Ohio	2	1
Vermont	0	18	Kentucky	3	0
Massachusetts	38	63	Tennessee	3	1
Rhode Island	5	0	Alabama	1	0
Connecticut	2	9	Michigan	0	2
New York (excluding Long Island)	1	11	Wisconsin	0	1
			Iowa	0	2

It will be at once evident that the southern extreme is not found in Newfoundland, Canada and northern New England and has not been seen from Michigan, Wisconsin and Iowa; conversely the northern variety, the only one known from these areas, becomes rare southward. In Massachusetts the northern plant with glabrous lower leaf-surfaces is generally dispersed, but all the material from the outer islands (Nantucket and Martha's Vineyard) and most from the southeastern mainland northward into Norfolk and southern Worcester Counties and up the sand plains of the Connecticut Valley is the southern extreme. From New York the only material of the southern extreme in the small representation studied is from Long Island and from the sand plains of the Hudson. The only Virginian material seen of the northern variety is from Bath and Giles Counties and the glabrous-leaved material from North Carolina (Lynn, Polk Co., and Blowing Rock) and Tennessee (Cade's Cove at 2300 feet) is from the mountains.

It is very clear then, that *Epigaea repens* occurs as two well defined geographic varieties ("subspecies," "apomicts," "races"): a prevailingly southern plant with mature leaves scabrous and persistently setose or pilose on both surfaces; and a prevailingly northern plant with the mature leaves glabrous (except for the sometimes pilose midrib) beneath (or promptly glabrate), the upper surface usually glabrous or glabrate. In the ciliation of leaves (before too much weathering) there is a strong tendency for the marginal hairs of the southern plant to be more crowded (FIG. 6) than in the northern (FIG. 5). This, how-

ever, is a secondary character. The half-expanded new foliage of the southern variety and of the northern variety well display the chief difference, the expanding leaf of the former pilose over the whole surface, that of the latter completely glabrous or glabrous between the more or less pubescent nerves.

In establishing the binomial, *Epigaea repens* L. Sp. Pl. 395 (1753) Linnaeus gave the "*Habitat in* Virginiae, Canadae *pinetis*"; but he cited only references to the plant of eastern Virginia:

> 1. EPIGAEA. *Gen. nov.* 1087.
> Memecylum. *Mich. gen.* 13. *repens.*
> Arbutus foliis ovatis integris, petiolis laxis longitudine foliorum. *Gron. virg.* 49.
> Pyrolae affinis repens fruticosa, foliis rigidis scabritie exasperatis, flore pentapetaloide fistuloso. *Pluk. alm.* 309. *t.* 107. *f.* I.
> *Habitat in* Virginiae, Canadae *pinetis.* ♄.

Mitchell's *Memaecylum* [original spelling], one of his "Nova genera plantarum Virginiensium" was, obviously, the southern extreme. Gronovius, quoting Clayton, said "foliis . . . scabris rigidis"; and Plukenet, with Virginia specimens from Banister, specially emphasized the harsh leaves, "Foliis rigidis, scabritie asperatis." There can be no question that the scabrous-leaved southern variety is typical *Epigaea repens*. The northern extreme may be called

EPIGAEA REPENS L., var. **glabrifolia**, var. nov. (TAB. 562, FIG. 1–3), foliis subtus glabris vel glabratis (venis interdum exceptis), paginis superioribus glabris vel glabratis.—Labrador to Saskatchewan, south to Newfoundland, Nova Scotia, New England, Pennsylvania, West Virginia, Ohio, Michigan, Wisconsin and Iowa, and along the mountains to North Carolina and Tennessee. TYPE: dryish open sandy plains, Middleton, Nova Scotia, July 20, 1920, *Fernald, Pease & Long,* no. 22,167 (in Gray Herb.).

In PLATE 562, FIG. 1 is a portion of the TYPE of var. *glabrifolia*, × 1; FIG. 2, the lower surface of a leaf, × 10; FIG. 3, lower surface and ciliation, × 10; FIGS. 4–6, details of typical *Epigaea repens:* FIGS. 4 and 5, upper and lower surfaces of leaf, × 10, from near Surry, Virginia, *Fernald & Long,* no. 9763; FIG. 6, ciliation of leaf, × 10, from Eastham, Massachusetts, *F. S. Collins.*

ASCLEPIAS INCARNATA L., var. PULCHRA (Ehrh.) Pers., forma **candida**, nom. nov. *A. pulchra* Ehrh., forma *albiflora* House, N. Y. State Mus. Bull. ccxliii.–ccxliv. 61 (1923), not *A. incarnata*, forma *albiflora* Heller in Bull. Torr. Bot. Cl. xxi. 24 (1894).

BACOPA **cyclophylla**, nom. nov. *Herpestis rotundifolia* Gaertn. f.,

Fruct. iii. 186 (1807), not *B. rotundifolia* (Michx.) Wettst. in Engl. & Prantl. Nat. Pflanzenf. iv[3b]. 76 (1891).

As shown by Pennell in Proc. Acad. Nat. Sci. Phila. lxxi. 244, for Dec., 1919 (March, 1920) and in Acad. Nat. Sci. Phil. Mon. i. 62, 63 (1935), *Herpestis rotundifolia* Gaertn. f., based primarily on a Bosc specimen, is not identical with *Monniera rotundifolia* Michx. (1803), which was the basis of *Bacopa rotundifolia* (Michx.) Wettst. Although *B. cyclophylla* is clearly distinct from *B. rotundifolia*, Pennell's definition of the latter (as *Macuillamia rotundifolia* (Michx.) Raf.) leaves the student in doubt. In defining *Macuillamia* on p. 49 (Mon. i. or Scroph. E. Temp. N. Am.) it is distinguished by "Corolla 7–8 mm. long"; but in the key to species on p. 57, *M. rotundifolia* and *M. obovata* are placed in a section with "corolla 5–7 mm. long" as contrasted with a third species with "corolla 3–4 mm. long." The helpless user of the key is "left high and dry." So he is when he trys the length of pedicels in the same key to species (p. 57). The first two species come under "pedicels 10–15 mm. long"; but the first of them there included is described with "pedicel 8–18 mm. long," the second with "pedicel 4–6 mm. long."

The North American Varieties of Veronica alpina (Plates 563–568).—The circumpolar *Veronica alpina* L. has at least seven strongly marked geographic varieties, six of them occurring in North America. In his "'Veronica' in North and South America"[1] Pennell (p. 14) defined true *V. alpina* (our pl. 563, figs. 1 and 2) of "Open slopes, East Greenland. Also in Scandinavia and the Highlands of Scotland," with "Capsule glabrous. Sepals glabrous on back, ciliate on margins, apparently but little shorter than the corolla. Plant usually 1–2 dm. tall, usually little branched at base," while he separated the European variety (our pl. 563, figs. 3 and 4) with "Capsule pubescent with glandless hairs. Sepals pilose on back as well as margins, much shorter than the corolla" as *V. pumila* Allioni; the latter extending south to the Pyrenees, Maritime Alps, Cevennes, etc. In all North America proper (west of Greenland) only the single *V. Wormskjoldi* was recognized, the variety of *V. alpina* with "Capsule and sepals with hairs which have rounded glandular tips, the sepals densely pilose on back. Plant usually 1.5–3 dm. tall, with pedicels 2–5 (–10) mm. long." *V. Wormskjoldi* (pl. 564) is the boreal American

[1] Pennell in Rhodora, xxiii. 1–22 and 29–41 (1921).

plant which, more conservatively, is known as *V. alpina*, var. *unalaschcensis* Cham. & Schlecht. (1827) or in Greenland as var. *villosa* (Wormskj.) Lange (1887). Pennell admitted the doubtfully worth while *V. Wormskjoldi nutans* (Bong.) Pennell, from the coast of Alaska; but in the three different plants of the cordilleran series (PL. 566–568) he saw only "a tendency . . . to have styles slightly longer, usually 1/4 to 1/3 the length of the capsule, rather than 1/6 to 1/4." Pennell's study is, so far as I am aware, the latest revision of all American members of the genus as such, although in 1932 he noted[1] the occurrence of *V. alpina* in both West and East Greenland and in Baffin Land. His "Scrophulariaceae of Eastern Temperate North America"[2] does not discuss the series, through the somewhat unique definition of Eastern Temperate North America as stopping at "the eastern border of New York on the east" (p. 1). Thus Pennell excluded from his consideration of the *Scrophulariaceae* of eastern temperate North America the *Veronica alpina* series of New Hampshire, Maine, Quebec and Newfoundland. Had his critical eye noted the alpine plant of northern Newfoundland (PL. 565), which I had misidentified as *V. alpina*, var. *unalaschcensis*, he would have found it as different from that too inclusive entity (*V. Wormskjoldi*) as the latter is from the southern European *V. pumila* of Allioni (PL. 563, FIGS. 3 and 4). Not only is the Newfoundland plant unique and really as near to *V. pumila* as to *V. Wormskjoldi;* the great mass of material from the Rocky Mountains to the Pacific seems to me strikingly unlike *V. Wormskjoldi*, to which Pennell and also Rydberg refer all cordilleran material. *V. Wormskjoldi* (*V. alpina*, var. *unalaschcensis*) occurs locally on alpine summits (at 3050–3500 m. alt.) south to Colorado, but most of the cordilleran material, from subalpine to Canadian areas, falls into three strikingly different endemic varieties (PLATES 566–568), one of wide range, another more restricted and in some characters more pronounced, another chiefly of the Cascade Mts. My interpretation of *Veronica alpina* in North America is condensed into the following synopsis.

a. Backs of sepals quite glabrous, the margins ciliate; capsule glabrous; flowering stems 0.5–2 dm. high; fruiting raceme dense, thick-cylindric, ellipsoid or obovoid, with most of the fruits imbricated . . . . . *V. alpina*, var. *typica.*

a. Backs of sepals and the capsules more or less pubescent . . . . *b.*

[1] RHODORA, XXXIV. 150 (1932).

[2] Acad. Nat. Sci. Phila. Mon. 1. (1935).

Photo. W. H. Hodge

VERONICA ALPINA, var. TYPICA: FIG. 1, flowering plant, × 1, from Greenland; FIG. 2, mature calyx and capsule, × 10, from Greenland.

Var. AUSTRALIS (Var. *lasiocarpa; Veronica pumila*): FIG. 3, fruiting plant, × 1, from Hautes-Pyrénées; FIG. 4, calyx and capsule, × 10, from the Alpes Maritimes.

Photo. W. H. Hodge

VERONICA ALPINA, var. UNALASCHCENSIS (*V. Wormskjoldi*): FIG. 1, fruiting plants, × 1, from Labrador; FIG. 2, calyx and capsule, × 10, from plant in fig. 1; FIG. 3, less pubescent calyx and capsule, × 10, from Labrador; FIG. 4, less pubescent calyx and dehisced capsule, × 10, from New Hampshire.

b. Fruiting raceme dense, thick-cylindric, ellipsoid or obovoid, 1–6.5 cm. long, 1–1.6 cm. thick, the fruits closely approximate to strongly imbricated, except for the 1–3 lowest sometimes subremote ones, villous with multicellular hairs; mature style (capping fruit) 0.8–1.8 mm. long.

Leaves blackened in drying, those midway on the stem 4–20 mm. broad; upper internodes of stem spreading-long-villous; ciliation of sepals long-villous, partly of round-tipped ("glandular") septate trichomes; capsules fuscous or greenish- or bluish-black, copiously villous with chiefly round-tipped trichomes. . . . . Var. *unalaschcensis.*

Leaves only slightly or barely blackening, those midway on stem 3–7 mm. broad; upper internodes of stem short-pilose or incurved-villous with mostly slender-tipped hairs; ciliation of sepals short-pilose; capsules pale-brown, sparsely villous. . . . . Var. *terrae-novae.*

b. Fruiting raceme lax, the distinctly pedicelled fruits or pairs of fruits mostly becoming distant, the mature racemes (1–) 3–15 cm. long. . . . *c.*

c. Foliage-leaves 4–8 pairs, mostly opposite, blackening in drying, the upper ovate and acutish, the larger 1–2.2 cm broad; lower bracts of raceme mostly lanceolate to ovate and equaling to exceeding their subtended flowers and fruits, upper bracts similar but narrower and shorter; lower 2–8 pairs of flowers and fruits opposite or subopposite; calyx 4–7 mm. long; style 0.75–1.5 mm. long; stems 1–4 dm. high. . . . . Var. *geminiflora.*

c. Foliage-leaves mostly oblong-lanceolate, elliptic or elliptic-ovate, with blunt or rounded tips, the larger 5–17 mm. broad; lower bracts of raceme mostly linear to lanceolate, the upper inconspicuous; calyx 2.5–4 mm. long; style 1.5–3 mm. long.

Leaves 4–7 pairs, often also 1–6 scattered alternate narrow upper ones, commonly drying green, the larger 5–12 (–17) mm. broad; flowers and fruits 9–25, mostly alternate; fruiting raceme slenderly cylindric, much interrupted, up to 1.2 dm. long, 0.5–1.2 cm. thick; sepals acute or acutish; capsule elliptic or narrowly obovate, 2.5–4 mm. broad; stems 1–3.3 dm. high. . . . . Var. *alterniflora.*

Leaves 3–5 (–6) pairs, all usually opposite, drying black, the larger 7–17 mm. broad; flowers and fruits 3–18, frequently opposite, the lower 1–3 pairs distant, the others subapproximate; fruiting raceme 1–7 (–9) cm. long, 1–1.4 cm. thick; sepals obtuse; capsule elliptic-suborbicular or broadly obovate, 4.5–5 mm. broad; stems 0.5–2 (–3) dm. high. . Var. *cascadensis.*

V. ALPINA L., var. **typica.** *V. alpina* L. Sp. Pl. 11 (1753); Pennell in RHODORA, xxiii. 14 (1921), ibid. xxxiv. 150 (1932); Devold & Scholander in Skrifter om Svalbard og Ishavet, no. 56 (Fl. Pl. and Ferns Se. Greenland): 82, figs. 16 (center) and 17 (1933). *V. alpina,* α *lapponica* Wahlenb. Fl. Carpat. Princip. 5 (1814).—Northern and alpine Europe and western Siberia; Greenland; eastern Arctic America, south to Port Burwell, Hudson Straits, northern tip of Labrador Peninsula (*Malte,*

nos. 120,142 and 120,177, both, as represented in the Gray Herbarium, a mixture of *V. alpina* vars. *typica* and *unalaschcensis*).

Var. *typica* (PL. 563, FIGS. 1 and 2), is ordinarily quite distinct in its glabrous capsule and the glabrous backs of the sepals; also in the usually non-ciliate upper leaves. The last character breaks and it is not difficult to find plants of Labrador and New England, otherwise good var. *unalaschcensis*, with essentially glabrous backs to the sepals (PL. 564, FIGS. 3 and 4). Although Pennell restricts typical *V. alpina* in Europe to "Scandinavia and the Highlands of Scotland," Devold & Scholander (l. c. 83) state that it is found south to the Swiss Alps. Pennell assigns typical *V. alpina* "Sepals . . . apparently little shorter than the corolla." This is, of course, a relative character; but several modern specimens before me show the corolla fully twice as long as the calyx (PL. 563, FIG. 1) and it is so shown in many illustrations. It cannot, therefore, be maintained as a constant character, that the sepals are only a little shorter than the corolla. Although var. *typica* is ordinarily characterized by its strictly glabrous capsule, there are in the Gray Herbarium several collections from Labrador and New Hampshire (PL. 564, FIGS. 3 and 4) with the nearly glabrous sepals almost of var. *typica* but with the capsules bearing some of the septate trichomes which, theoretically, should never be found on plants with glabrous-backed sepals; consequently, when it is maintained that the polymorphic North American series which Pennell and, following him, Devold & Scholander, call a species, *V. Wormskjoldi*, is specifically separated from *V. alpina*, var. *typica* because it has pubescent capsules and pubescent backs of the sepals, it must be admitted that the pubescence varies from dense and abundant to very sparse or almost negligible (PL. 564, FIGS. 2–4).

Var. UNALASCHCENSIS Cham. & Schlecht. in Linnaea, ii. 556 (1827); Robinson & Fernald in Gray, Man, ed. 7: 728 (1908). *V. Wormskjoldi* Roemer & Schultes, Syst. i. 101 (1817); Pennell in RHODORA, xxiii. 15 (1921), as *Wormskjoldii;* Devold & Scholander, l. c. 84, figs. 16 (right) and 18 (1933); Hultén, Fl. Aleut. Isl. 291 (1937). *V. villosa* Wormskj. ex Roemer & Schultes, l. c. as syn. (1817). *V. alpina*, var. *Wormskioldii* (Roem. & Sch.) Hook. Bot. Mag. lvii. t. 2975, as to source of name (1830). *V. nutans* Bong. in Mém. Acad. Petersb. ii. 157 (1833). *V. alpina*, var. *villosa* (Wormskj.) Lange, Consp. Fl. Groenl. 261 (1887), name taken from "v. v i l l o s a Wormskj. mscr." *V. Wormskjoldi nutans* (Bong.) Pennell in RHODORA, xxiii. 15 (1921).—Greenland and Arctic America, south to subalpine meadows, wet rocks and moss and brook-sides of Shickshock Mts., Gaspé Co., Quebec, Mt.

Katahdin, Maine and White Mts., New Hampshire; along the higher Rocky Mts. to Colorado (3050–3500 m.); Pyrenees.

Var. *unalaschcensis* (PL. 564), apparently not differing from var. *villosa* (*V. Wormskjoldi*), has, as already noted, been stretched to cover nearly all North American plants of the *V. alpina* affinity. In its restricted sense it is the most northern of the series with regularly pubescent capsules, although in subalpine to alpine situations it extends southward to Gaspé, northern New England and Colorado. Much emphasis has been placed by recent authors (Pennell, Devold & Scholander, Hultén) upon the gland-tipped trichomes of its capsule and calyx, as opposed to the nonglandular trichomes of *V. alpina*, var. *australis* Wahlenb. (1814) or var. *lasiocarpa* Hartm. (1832) (*V. pumila* Allioni) of Europe (PL. 563, FIGS. 3 and 4). There is a not always perfectly clear difference in the hairs; whether they are actually gland-tipped in var. *unalaschcensis* I have not fully convinced myself. Like the trichomes of var. *australis* they are septate and moniliform. In var. *australis* (or var. *lasiocarpa*) (PL. 563, FIG. 4) the cells are elongate and the terminal one prolonged and without conspicuous dark content. In var. *unalaschcensis* the cells are shorter and the terminal cell, after the shrinking of the trichome in drying, shows as an ovoid to subglobose short tip, sometimes with dark content. Since they have very regularly been called gland-tipped hairs we will so call them.

Pennell (RHODORA, xxiii. 14, 15) allows the European plant capsules and sepals only with "pubescence with glandless hairs" and a height of "usually .5–1 dm.," while his *V. Wormskjoldi* has the "hairs with rounded glandular tips" and a height of "usually 1.5–3 dm." In view of Pennell's inclusion under his "*V. Wormksjoldii*" of five quite different and mostly isolated North American plants (one with stems up to 4 dm. high, two with them down to 0.5 dm., one with dense subcapitate fruiting racemes sometimes only 1 cm. in length, another with the loose and remotely fruited racemes up to 1.5 dm. long) which differ from one another as much as do *V. Wormskjoldi* and *V. pumila*, it is worth noting that the gladular hairs usually ascribed only to var. *unalaschcensis* (*V. Wormskjoldi*) may occur, likewise, in the European var. *australis* or *lasiocarpa* (*V. pumila*). Devold & Scholander quote Coste, in his Flore de la France, who described the plant of the Pyrenees, the Jura, the Alps, the Auvergne and Corsica: "Plante vivace de 5–15 cm., poilue-glanduleuse dans de haut, . . . celle-ci

[capsule] bien plus long que le calice poilue-glanduleuse." They characterize Coste's description as "due to a mistake," though they go on: "But it is not impossible that it is based on some glandular specimens of *V. Wormskjoldii* from Europe, so much the more as we have seen two specimens from the Pyrenées which are densely glandular pubescent, and which, accordingly, cannot with certainty be distinguished from *V. Wormskjoldii.*"

Discussing true *V. alpina* (which they do not recognize as occurring in America, except in Greenland) and the European *V. pumila* (*V. alpina,* var. *australis* or *lasiocarpa*), the last quoted authors state that "The quite extensive material Scholander has seen from Scandinavia and Central Europe has absolutely convinced him that these two species are distinct. He has never seen intermediate forms and the geographical distribution is likewise convincing." Even though *V. alpina* and *V. pumila* may not be demonstrated to pass directly from one to the other it is important to remember that the glabrous-backed sepals of the former are sometimes too closely approached in plants of eastern North America which are otherwise good *V. Wormskjoldi.* Furthermore, when the late Dr. M. O. Malte got *V. alpina* at Port Burwell (southern entrance to Hudson Strait) he twice collected it mixed with var. *unalaschcensis* (*V. Wormskjoldi*), apparently without noting them as distinct species or even as varieties. These two grow together in eastern North America; and several collection from Greenland show them mixed. If, in the Pyrenees, the home of the "distinct" *V. pumila,* some specimens "are densely glandular pubescent, and . . . , accordingly, cannot with certainty be distinguished from *V. Wormskjoldii,*" we have little in the way of *absolute* specific and phytogeographic difference left. The repeated assertion that *V. Wormskjoldi* is a species because it "may reach a height of 30 cm." does not prove it a species; plenty of American plants with the characters of *V. Wormskjoldi* may be as small as *V. pumila.* If the latter in the Pyrenees may be so glandular that it cannot be separated from the former it seems to me that the two are not specifically distinct. PLATE 563, FIGS. 3 and 4 show *V. pumila* from southern Europe; PL. 564, FIGS. 1 and 2 show dwarf *V. Wormskjoldi* from Labrador. As "distinct" species they make a weak display; species, like ambition, "should be made of sterner stuff."

Although maintaining *Veronica Wormskjoldi* as a species, Hultén (p. 292) discreetly says: "In the Scandinavian material of *V. alpina*

Photo. W H. Hodge

VERONICA ALPINA, var. TERRAE-NOVAE: FIG. 1. portion of TYPE, × 1; FIG 2, axis of raceme, showing nonviscid pilosity, × 10; FIG 3. fruiting raceme, × 2.

Photo. W. H. Hodge

VERONICA ALPINA, var. GEMINIFLORA: FIGS. 1 and 2, a single plant, × 1, from TYPE-SHEET; FIG. 3, fruiting raceme, × 1, from Yellowstone Park; FIG. 4, flowering raceme × 1, from Idaho; FIG. 5, calyx and capsule, × 10, from British Columbia.

and *V. alpina* var. *lasiocarpa* (= *pumila* All.) I found a few individuals with the same general appearance as *V. Wormskjoldii,* but lacking the glandular tips of the calyx- and capsule-hairs. This characteristic is the only one by which I can distinguish those specimens from *V. Wormskjoldii,* and I thus think that *V. Wormskjoldii* might as well be regarded as a variety (subspecies) of *V. alpina.*" Although Hultén thought that *V. Wormskjoldi* "might as well be regarded as a variety of *V. alpina,*" he maintained it as a species; although Scholander, as recorded by Devold & Scholander, was "absolutely convinced . . . that these two species [*V. alpina* and *V. pumila*] are distinct," Hultén treated them as varieties and recorded Scandinavian material of *V. alpina* var. *australis* or *lasiocarpa* (*V. pumila*) as differing from *V. Wormskjoldi* only in lack of glandular pubescence. Devold & Scholander, as already noted, found plants from the Pyrenees which they associated with *V. pumila* but "densely glandular pubescent, . . . which . . . cannot with certainty be distinguished from *V. Wormskjoldii.*" Such observations merely accentuate that *V. alpina* is a circumpolar species with several well defined but not always separable varieties. Those who ignore such intergrading of characters will recognize six "species" in North America.

Var. **terrae-novae**, var. nov. (TAB. 565), caulibus subrigidis 1–2 dm. altis apice griseo-pilosis vel adpresso-villosis, villis plerumque eglandulosis; foliis firmis vix nigrescentibus ellipticis, imis oppositis, supernis alternatis vel oppositis valde reductis, mediis 3–7 mm. latis; racemis fructiferis ellipsoideis vel obovoideis 1–3.5 cm. longis 0.9–1.3 cm. crassis fructibus valde imbricatis; sepalis pilosis pilis plerumque vix glandulosis; capsulis ellipsoideo-obovoideis pallide brunneis sparse minuteque pilosis.—NEWFOUNDLAND: wet quartzite rocks and gravel along brook, Southwest Gulch, northeast of summit of Bard Harbor Hill, Highlands of St. John, August 22, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 28,965 (distributed as var. *unalaschcensis*).

At once distinguished by its mostly eglandular and chiefly incurving pubescence and by the pale-brown capsules. Var. *unalaschcensis,* with more spreading and more viscid pubescence, has the capsules (until weathered over winter) greenish- or bluish-black or fuscous. In the reduction of glandular hairs var. *terrae-novae* is as near to var. *australis* or *lasiocarpa* of Europe as to var. *unalaschcensis,* but var. *australis* has the capsules as dark as those of var. *unalaschcensis* and the pubescence of the inflorescence more conspicuous. Var. *terrae-*

novae, in its relationship to a European variety of *Veronica alpina*, is peculiarly interesting. Along the alpine and subalpine brooks of Bard Harbor Hill or in neighboring regions of northwestern Newfoundland there are many plants of Europe or representatives of European plants which in America are known only in Newfoundland.

Var. **geminiflora**, var. nov. (TAB. 566), caulibus subrigidis 1–4 dm. altis apice plus minusve glanduloso-pilosis; foliis plerumque oppositis 4–8-jugis, mediis superioribusque ovatis acutiusculis, majoribus 1–2.2 cm. latis; racemis deinde laxis 3–15 cm. longisque, floribus imis oppositis vel subopppositis (rariter alternatis); bracteis imis lanceolatis vel ovatis elongatis; pedicellis imis 2–10 mm. longis; calycibus 4–7 mm. longis capsulisque glanduloso-pilosis; stylo 0.75–1.5 mm. longo.—Rocky Mountains and adjacent ranges, southern Alberta and southern British Columbia to Colorado and Arizona. ALBERTA: Lake Louise, August 15, 1909, *Olson*. BRITISH COLUMBIA: Selkirk Mts., near Glacier, July 29, 1895, *Canby;* Snowsheds, Glacier, alt. 4100 feet, July 23, 1908, *Butters & Holway*, no. 380 (flowers more alternate than usual); Beaverfoot Mts., near Carbonate Draw, alt. 7800 ft., July 13, 1904, *C. H. Shaw*, no. 252; Prospector's Valley, alt. 6250 ft., July 15, 1907, *Butters & Holway*, no. 137. WYOMING: wet springy places, mountains north of Government Bridge on Buffalo River, August 6, 1901, *Merrill & Wilcox*, no. 1145; moist alpine parks, Medicine Bow Mts., Albany Co., July 30, 1900, *Aven Nelson*, no. 7843; moist meadow, alt. 8000 ft., Crazy Woman Creek, Shoshone National Forest, Park Co., July 14, 1937, *L. O. & R. P. Williams*, no. 3556; Union Pass, August 11, 1894, *Aven Nelson*, no. 831; east of Lacy's Creek, alt. 7500 ft., Yellowstone Park, August 10, 1897, *Rydberg & Bessey*, no. 4937. IDAHO: moist meadow, alt. 8700 ft., Teton Pass Mts., east of Victor, July 22, 1920, *Payson & Payson*, no. 2075. COLORADO: Ida Bell Mine, alt. 11,500 ft., Summit Co., August 8, 1917, *Clokey*, no. 2890; headwaters of Clear Creek and ridges east of Middle Park, 1861, *Parry*, no. 237; Seven Lakes, alt. 3500 m., July 4, 1901, *F. E. & E. S. Clements*, no. 320; Marshall Pass, alt. 11,500 feet, July 19, 1901, *C. F. Baker*, no. 507; alpine meadows, summit of North Park Range, Routt Co., August 8, 1903, *Goodding*, no. 1802; near Pagosa Peak, alt. 11,500 ft., August 6, 1899, *C. F. Baker*, no. 607 (TYPE in Gray Herb.); summit of Wolf Creek Pass., alt. 10,900 ft., San Juan Mts., Mineral Co., July 28, 1928, *Carl B. Wolf*, no. 3008; lake-margin, alt. 9000 ft., mountains east of Colona, August 29, 1920, *E. B. Payson*, no. 2348. UTAH: wet meadow, alt. 10,100 ft., ridge east of Stillwater Fork, Uintah Mts., Summit Co., July 17, 1926, *E. B. & L. B. Payson*, no. 5007; Cottonwood Cañon, alt. 9000 ft., July, 1869, *S. Watson*, no. 805; Big Cottonwood Cañon, Salt Lake Co., August, 1905, *O. A. Garrett;* grassy hummock in woods, alt. 10,200 ft., northeast of Paradise Park, northwestern Uintah Co., August 16, 1935, *E. H. Graham*, no. 10,035; open moist woods, alt. 11,250 ft., Mt. Emmons, Krebs Basin, Duchesne

Photo. W. H. Hodge

VERONICA ALPINA, var. ALTERNIFLORA: FIGS. 1 and 2, a single plant, × 1, from the TYPE-SHEET; FIG. 3, raceme, × 1, from California; FIG. 4, calyx and capsule, × 10, from plant in fig. 3.

Photo. W. H. Hodge

VERONICA ALPINA, var. CASCADENSIS: FIG. 1, portion of TYPE, × 1; FIG. 2, fruiting racemes, × 1, from Mt. Hood, Oregon: FIG. 3, calyx and capsule, × 10, from the type-region, Mt. Rainier, Washington.

Co., July 20, 1933, *F. J. Hermann*, no. 5131; meadows, alt. 10,500 ft., La Sal Mts., Grand Co., July 31, 1924, *Payson & Payson*, no. 4077. ARIZONA: Humphrey's Peak, 9000–12,000 ft., San Francisco Mt., August 7–10, 1898, *MacDougal*, no. 386.

In its characteristic development var. *geminiflora* is the coarsest of all the varieties of *Veronica alpina*, the stem being relatively stout and tall, the leaves large (the middle and upper ovate and acutish), mostly opposite, and the large-bracted raceme, with lower flowers paired or subopposite, lengthening up to 1.5 dm. Its sepals, too, are the longest in the species. In the western part of its range var. *geminiflora* is often mixed with var. *alterniflora* and seems to pass into it; in the northwestern border of its range (southern British Columbia to Oregon) there is some transition to var. *cascadensis*. In extreme subalpine areas it seems to merge into var. *unalaschcensis*.

Var. **alterniflora**, var. nov. (TAB. 567), caulibus gracilibus 1–3.3 dm. altis apice minute pilosis; foliis ellipticis vel oblongo-ovalibus obtusis vel apice rotundatis, imis mediisque oppositis majoribus 5–12 (–17) mm. latis, superioribus plerumque alternatis valde reductisque; racemis deinde laxis alternifloris ad 1.2 dm. longis, 0.5–1.2 cm. diametro valde interruptis 9 25-floris; pedicellis imis 3–8 mm. longis; calycibus 2.5–4 mm. longis acutis vel acutiusculis piloso-hispidulis, pilis plus minusve glandulosis; capsulis ellipticis vel anguste obovatis 2.5–4 mm. latis; stylo 1.5 3 mm. longo.—Selkirk Mts., British Columbia, to the Big Horn and Teton Mts., Wyoming, the Clover Mts., Nevada, and the Sierra Nevada, California. BRITISH COLUMBIA: alpine rivulet at 6600 ft., Prairie Hills, July 23, 1904, *H. Petersen*, no. 384; Mount Molar Creek, July 9, 1904, *J. Macoun*, no. 67,810. MONTANA: at 7000 ft., Bald Mt., southern Montana, July 21, 1880, *S. Watson*, no. 315. WYOMING: banks of South Tongue River, near mouth of Marcum Creek, alt. 8000 ft., Sheridan Co., June 24, 1936, *L. O. & Rua Williams*, no. 3093; borders of parks, Obsidian Creek, Yellowstone Park, July 24, 1899, *A. & E. Nelson*, no. 6087; wet soil, Teton Mts., July 26, 1901, *Merrill & Wilcox*, no. 1034. IDAHO: moist meadow, alt. 6400 ft., Cape Horn, Custer Co., August 6, 1916, *Macbride & Payson*, no. 3632 (TYPE in Gray Herb.); moist, mossy streambank at 7500 ft., Salmon River Mts., near Bonanza, Custer Co., July 25, 1916, *Macbride & Payson*, no. 3427; by alpine stream, head of Boulder Creek, at 9000 ft., Sawtooth National Forest, Blaine Co., August 6, 1937, *J. W. Thompson*, no. 14,113. OREGON: without specified locality, 1871, *E. Hall*, no. 383; brooksides, Crater Lake, Klamath Co., August 12, 1896, *Applegate*, no. 422. NEVADA: Clover Mts., alt. 9000 ft., September, 1868, *S. Watson*, no. 805. CALIFORNIA: dry sunny stream-bank, Lily Lake, Pine Creek, alt. 7000 ft., Warner Mts., Modoc Co., August 10, 1935, *L. C. Wheeler*, no. 3821 (transition

to var. *cascadensis*); Lassen Peak, August, 1882, *Mrs. R. M. Austin;* headwaters of Hat Creek, at 2120 m., Shasta Co., July 31 and August 1, 1911, *W. W. Eggleston*, no. 7395 (transition to var. *geminiflora*); Gilmore lake meadow, Tahoe, alt. 8500 ft., July 31, 1913, *Smiley*, no. 3771; Ebbett's Pass, alt. 8500 ft., 1863, *Brewer*, no. 8022; Mono Pass, alt. 10,000 ft., 1866, *Bolander*, no. 5048; head of Tuolumne, alt. 9000 ft., 1863, *Brewer*, no. 1764; open grassy ground, Tuolumne Meadows, alt. 8600 ft., Tuolumne Co., July 17, 1907, *R. A. Ware*, no. 2635C; Tuolumne Meadows along the river, alt. 8500 ft., Yosemite Park, August 13, 1916, *Smiley*, no. 751; meadows, Farewell Gap, alt. 10,400 ft., 1897, *Purpus*, no. 5236.

In its very slender fruiting raceme suggesting *Veronica humifusa* and *V. serpyllifolia*, but with the flowers, fruit, foliage and habit of the *V. alpina* series.

Var. **cascadensis**, var. nov. (TAB. 568), caulibus tenuibus flexuosis vel strictis 0.5–2 (–3) dm. altis apice glanduloso-hirtellis; foliis ellipticis vel ovalibus submembranaceis, apice obtusis, plerumque oppositis 3–5 (–6)-jugis, majoribus 7–17 mm. latis; racemis deinde laxis 3–18-floris 1–7(–9) cm. longis 1–1.4 cm. diametro, fructibus imis oppositis distantibus, superioribus subapproximatis; sepalis 2.5–4 mm. longis obtusis pilosis; capsulis plus minusve pilosis elliptico-suborbicularibus vel late obovatis 4.5–5 mm. latis; stylo 1.5–3 mm. longis.—Coast Ranges of Alaska to Oregon, chiefly in the Cascade Mountains. ALASKA: at 3000 ft., Silver Bow Basin, Juneau, August 6, 1891, *Grace E. Cooley*. BRITISH COLUMBIA: alpine meadow, alt. 6000 ft., in the Big Bend District, lat. about 51° 45′, long. 118° 20′, July 22, 1905, *C. H. Shaw*, no. 937; Chilliwack Valley, alt. 4000 ft., July 9, 1901, *J. M. Macoun*, no. 54,504 in part (somewhat mixed with var. *geminiflora*); Clemenceau Creek Valley, alt. 7000 ft., July 16–Aug. 10, 1927, *A. J. Ostheimer, 3d*, nos. 97 and 117; sides and open grassy ravines, alt. 4000 ft., Mt. Arrowsmith, Vancouver Island, July 24, 1915, September, 1916, *W. R. Carter*. WASHINGTON: moist meadows near Lodge, at 4200 ft., Mt. Baker region, July 22 and 23, 1930, *J. W. Thompson*, no. 5272; delta above Bagley Lake, alt. 4300 ft., Mt. Baker region, Whatcom Co., August 14, 1930, *Thompson*, no. 5728; by alpine rivulets above Bagley Lake, Mt. Baker Lodge, Whatcom Co., August 19, 1931, *Thompson*, no. 8014 (6 individuals in the Gray Herbarium wholly typical, the 7th with unusually prolonged and alternate-fruited raceme suggesting the preceding variety, but with the broad capsules of this); wet bank of stream at 7500 ft., Mt. Stuart, Chelan Co., August 20, 1930, *Thompson*, no. 5838; Stevens Pass, alt. 3950 ft., Cascade Mts., August 9, 1893, *Sandberg & Leiberg*, no. 710; rich meadows at 6500 ft., Mt. Rainier, August, 1895, *Piper*, no. 2083; wet places, alt. 5500 ft., Mt. Rainier, August 10, 1897, *O. D. Allen*, no. 277 (TYPE in Gray Herb.). OREGON: Cascade Mts., 1859, *Lyall;* alpine slopes and meadows, Mt. Hood, August 1, 1924, *Henderson*, no. 941;

Elk Meadows, alt. 5000 ft., Mt. Hood, July 22, 1928, *J. W. Thompson*, no. 5055 (unusually tall, up to 3 dm.); mountain meadow at 6000 ft., Hunt's Cove, 4 miles south of Mt. Jefferson, August 14, 1919, *J. C. Nelson*, no. 2823; shady bank of Paulina Creek, near Paulina Lake, Crook Co., July 26, 1920, *M. E. Peck*, no. 9662; black hemlock forest, Crater Lake National Park, July 20, 1918, *Heller*, no. 13,048; Union Co., 1878, *Cusick*.

Var. *cascadensis* apparently has very large flowers, but without knowledge of fresh material it is impossible to reach an accurate understanding either of color or true size of the corolla.

Explanation of Plates 563–568

Plate 563. Veronica alpina L., var. typica: fig. 1, flowering plant, showing relatively large corolla, × 1, from Upernavik, Greenland, July 14, 1929, *M. P. & R. T. Porsild;* fig. 2, glabrous capsule and glabrous but ciliate sepals, × 10, from S. Strom Fiord, West Greenland, August 1, 1923, *Ralph Robinson*.

V. alpina, var. australis Wahlenb. (Var. *lasiocarpa* Hartm.; *V. pumila* All.): fig. 3, plant, × 1, from Campvieil, Hautes-Pyrénées, août 1870, *Bordère;* fig. 4, villous sepals and capsule, × 10, from Col de la Madonna, Alpes Maritimes, *Bourgeau*, no. 208.

Plate 564. Veronica alpina L., var. unalaschcensis Cham. & Schlecht. (*V. Wormskjoldi* R. & S.): fig. 1, small plants, × 1, from south of Cape Mugford, Labrador, *A. E. Prosild*, no. 210; fig. 2, viscid-villous sepals and capsule, × 10, from *Porsild*, no. 210; fig. 3, fruit, showing barely pubescent sepals and capsule, × 10, from Hebron, Labrador, *Sornborger*, no. 17; fig. 4, mature (dehisced) fruit, showing barely pubescent sepals and capsule, × 10, from Tuckerman's Ravine, White Mts., New Hampshire, September 1, 1877, *Faxon*.

Plate 565. Veronica alpina L., var. terrae-novae, n. var., all figs. from the type, Bard Harbor Hill, Highlands of St. John, Newfoundland, *Fernald & Long*, no. 28,965: fig. 1, portion of plant, × 1; fig. 2, axis of raceme, to show nonviscid pilosity, × 10; fig. 3, fruiting raceme, × 2.

Plate 566. Veronica alpina L., var. geminiflora, n. var.: figs. 1 and 2, a single plant, × 1, from the type-sheet, near Pagosa Peak, Colorado, *C. F. Baker*, no. 607; fig. 3, inflorescence, × 1, from Yellowstone Park, *Rydberg & Bessey*, no. 4937; fig. 4, young inflorescence, × 1, from Teton Pass Mts., Idaho, *Payson & Payson*, no. 2075; fig. 5, large calyx and capsule, × 10, from Glacier, British Columbia, *Butters & Holway*, no. 380.

Plate 567. Veronica alpina L., var. alterniflora, n. var.: figs. 1 and 2, one of type-specimens, × 1, from Cape Horn, Custer County, Idaho, *Macbride & Payson*, no. 3632; fig. 3, summit of plant, × 1, from Farewell Gap, California, *Purpus*, no. 5236; fig. 4, characteristic short calyx and capsule, × 10, from *Purpus*, no. 5236.

Plate 568. Veronica alpina L., var. cascadensis, n. var.: fig. 1, portion of type, × 1, from Mt. Rainier, Washington, *O. D. Allen*, no. 277; fig. 2, fruiting racemes, × 1, from Mt. Hood, Oregon, *Henderson*, no. 941; fig. 3, characteristic short sepals and broad capsule, × 10, from Mt. Rainier, Washington, *Piper*, no. 2083.

Solidago gigantea Ait., var. **leiophylla**, nom. nov. *S. serotina* Ait. Hort. Kew. iii. 211 (1789), not Retz. Obs. ii. 26 (1781).

Although Mackenzie, in Small, Man. 1359 (1933), took up *Solidago*

serotina Retzius in the place of *S. serotina* Aiton (independently published as a different species) there is every probability that the two had nothing to do with one another. *S. serotina* Ait. is the tall (up to 2.5 m. high) glabrous plant of alluvium and rich thickets, with very erect and glaucous stem, numerous lanceolate to narrowly oblong strongly ascending glabrous leaves, large terminal secund panicle, the heads with several ligules and numerous disk-corollas. *S. serotina* Retz. was well described: *stems* 2–3 *feet high,* somewhat *flexuous; leaves deflexed;* heads forming a terminal raceme, secund in leafy fascicles of 3–6; ligules 4, rarely 5; disk-corollas 3–5; and Retzius stated that some of the flowers become white on drying, so that the dried flowers are of two colors. All attempts to locate an authentic specimen of the species of Retzius have failed; but surely a plant with somewhat flexuous low stems, with deflexed leaves, and with leafy fascicles of 3–6 heads having only 3–5 disk-corollas (strongly suggesting *S. caesia* L.) is not the same as *S. serotina* Aiton. The latter name (1789) is, therefore, a later homonym and we are forced to take up in its place for the aggregate-species *S. gigantea* Ait. l. c. (1789).

Typical *Solidago gigantea* has the leaves pilose at least on the veins beneath, and the involucres 3.2–4 mm. high. It grows, usually, in less fertile soil than var. *leiophylla* (leaves glabrous on both sides, the involucres 3.5–5 mm. high) and has a more southerly extension, in the lower as well as the upland regions south to Florida, Alabama, Mississippi, Louisiana and Texas; var. *leiophylla* extending south in the richer valleys eastward only to the upland of North Carolina and Tennessee.

It seems safest to give a wholly new name to *Solidago serotina* Ait., treated as a variety, rather than to take up, perhaps erroneously, any of the names which by some have been placed in its synonymy. *S. glabra* Desf. Cat. Hort. Paris, ed. 3: 402 (1829), based on a garden plant cultivated in Paris, presumably belongs here. Material reputed to be it, from cultivated specimens now in the Gray Herbarium, is a very narrow-leaved form; but *S. glabra* Desf. (1829) was antedated by *S. glabra* Mill. (1768). Gray (Synop. Fl.) cites "*S. fragrans* Hort. Par., not Willd.," the name, published in synonymy and also a later homonym, quite inadmissible. *S. Pitcheri* Nutt. in Journ. Acad. Phil. vii. 101 (1834) has been referred to *S. serotina* Ait.; but, if it is this plant, it is not very typical. Nuttall's diagnosis emphasized the prominent serration of the leaves (foliis . . . argute serratis) and the small

Type of Pluchea camphorata (Erigeron camphoratum L.), courtesy of Mr. John Ramsbottom.

heads (parviflora), and he said "It has some affinity to *S. arguta;* its habit is that of *S. canadensis*, but its leaves are not conspicuously nerved." Gray noted upon a sheet of Geyer's no. 30 from St. Peter's River, an unusually broad-leaved specimen, "Nuttall's *S. Pitcheri* is just this, except that the heads are smaller, as in *canadensis*"; and in the Synoptical Flora, placing *S. Pitcheri* in the synonymy of *S. serotina* Ait., he characterized it as "with broad and comparatively short leaves and rather smaller heads." In view of the complexity of the plants of this alliance in "Arkansas" it is not safe to take up *S. Pitcheri* "foliis . . . oblongo-lanceolatis . . . argute serratis, panicula. . . parviflora" as quite identical with *S. serotina* Ait. "foliis lineari-lanceolatis . . . serratis triplinerviis."

The Identity of Pluchea camphorata (Plate 569). In the northeastern United States we have three species of *Pluchea:* (1) *P. foetida* (L.) DC., based on *Baccharis foetida* L., a perennial with sessile or broadly half-clasping leaves and with creamy-white flowers, extending from the southernmost states northward to southern New Jersey and southeastern Missouri; (2) a tarry-smelling annual with the oval to lanceolate sessile or very short-petioled leaves remotely to obscurely toothed or subentire, the corymb flat-topped, the very many-flowered involucres pilose, the corollas pink or purple, this species coastwise, chiefly in salt marsh or brackish soil or on coastal sands, northward to southern Maine, also in saline areas of interior New York and Michigan. This is the plant identified in Britton & Brown's Illustrated Flora, iii. 396 (1898) and in practically all subsequent works as *P. camphorata* (L.) DC., based on *Erigeron camphoratum* L.; (3) the annual or perennial with "catty" odor (sometimes said to be camphor-like, sometimes like that of the skunk, though John Clayton said of it "this whole plant hath á very strong and gratefúll scent"), the long-petioled lanceolate to lance-ovate and acuminate leaves copiously serrate with callous teeth, the terminal and lateral corymbs rounded, the involucres of the roseate flowers glabrous or merely granular on the back. This is *P. petiolata* Cassini or *P. viscida* (Raf.) House. It occurs in fresh (rarely brackish) marshes, shores and ditches from Florida to Texas, north to Maryland and to southern Ohio, Indiana, Illinois and Missouri.

Asa Gray, who had studied the types, did not separate as species our nos. 2 and 3; consequently, he correctly took up for the aggregate

species the earliest name, *Pluchea camphorata*, in the Synoptical Flora of North America assigning the habitat of no. 2, "Salt marshes and moist saline soil, Mass. to Florida, Texas, Arizona, and coast of California," but adding the partially clarifying note: "in shady places or less saline soil, with leaves thinner and more petioled, and involucre almost glabrous, when it is *P. petiolata*, Cass."

Gray's treatment would have been nearer to the situation as we now understand it if he had reversed his two phrases and had given the note on *P. petiolata* as indicating the habitat and characters of true *P. camphorata* and had then said that in salt marshes and moist saline soil the sessile-leaved plant with pilose involucres is *P. marylandica* (Michx.) Cassini; for the type and only plant concerned in the typification of *Pluchea camphorata* is quite characteristic *P. petiolata* Cass. or *P. viscida* (Raf.) House.

Pluchea camphorata rests upon *Erigeron camphoratum* L. Sp. Pl. ed. 2: 1212 (1763). The Linnean treatment was unusually definite and free from complication.

camphoratum. 14. ERIGERON foliis lanceolato-ovatis villosis: serraturis apice cartilagineis. *Hort. ups.* 259. *Gron. virg.* 122.
Baccharis foliis ovato-lanceolatis serratis, caule herbaceo. *Gron. virg.* I. p. 97 [error for 96].
Habitat in Virginia. ⊙.

Except for the reference to his own Hortus Upsaliensis (1748) Linnaeus, it will be noted, referred only to Gronovius, to page 96 of ed. 1 (1739), to page 122 of ed. 2 (1762). The treatment in Hortus Upsaliensis was as follows:

4. ERIGERON foliis lanceolato ovatis villosis serraturis apice cartilagineis.
Baccharis foliis ovato-lanceolatis serratis, caule herbaceo. *Gron. virg.* 96
Habitat in *Virginia.*
Hospitatur in *Caldario, & Tepidario*, annua.
Obs. *Herba odore camphorato suaveolens.*

Following back to the original account of Clayton's no. 165 by Gronovius it becomes evident that Linnaeus composed his diagnosis by adding a portion of Clayton's own description of his plant to that of Gronovius, unfortunately substituting "villosis" for Clayton's more accurate "mollibus." The original account by Gronovius read

B A C C H A R I S foliis ovato-lanceolatis serratis, caule herbaceo. Conyzae affinis floribus purpureis, foliis amplis integris viridi-fuscis mollibus odoratis. *Clayt. n.* 165.

On the sheet of no. 165 is the further comment, doubtless originating with Clayton: "Elechrysum with á soft red flower; this whole plant hath á very strong and gratefúll scent. D. Clayton ex Virginia num. 165." The photograph of Clayton's no. 165, type of *Erigeron camphoratum* L., consequently of *Pluchea camphorata* (L.) DC., for which I am indebted to Mr. John Ramsbottom, Keeper of Botany at the British Museum, is reproduced, × 4/5, as Plate 569. That it is a fragment from the summit of a plant of *P. petiolata* Cassini will be evident to those who know that plant.

The first available name for the salt-marsh plant with sessile or but short-petioled less toothed leaves, flat-topped corymbs and pilose involucres (our no. 2) seems to be Pluchea marilandica [as *marylandica*] (Michx.) Cassini in Dict. Sci. Nat. xlii. (1826), based on *Conyza marilandica* Michx. Fl. Bor.-Am. ii. 126 (1803).

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1. SOME SPECIES OF NOTHOLAENA, NEW AND OLD.

By W. R. Maxon and C. A. Weatherby.

I. The Group of Notholaena nivea.

This group is characterized by the bi- to tri- or subquadripinnate lamina, which is either glabrous or with ceraceous indument; petiolate pinnae and pinnules and small, usually entire or trilobate, often distant ultimate segments, which are articulate on their pedicels; elongate more or less gymnogrammoid sori, which commonly occupy at least the outer third of the veins; usually rugose spores (*N. incana* excepted); and brown, concolorous, linear or linear-subulate, rather thin rhizome-scales with elongate, slender-walled cells. From the related group of *N. dealbata*, *N. limitanea* and *N. Fendleri*, it is most readily distinguished by its articulate ultimate pinnules. The articulation is rather obscure but is evidenced by the abrupt stopping of the dark color of the pedicel at the base of the pinnule, the costule being green for its whole length, and by the clean and even transverse fracture left when, in age, the pinnule falls off. In *N. dealbata* and its immediate relatives the dark color passes without interruption part way up the costule and the fallen pinnules leave a comparatively irregular and ragged fracture.

The placing of the group to which *N. nivea* belongs (*Cincinalis* of Desvaux) in *Notholaena* has been repeatedly questioned. In general habit and in type of sorus and spore it agrees well with species of *Pellaea*, sect. *Eupellaea*. But, although very different in habit and vestiture, it also agrees in type of sorus, spores, and thin, concolorous rhizome-scales with species of *Eunotholaena*,[1] such as *N. marantae* and *N. sinuata*. Nevertheless, its sori are, in their extreme condition in *N. incana*, much more gymnogrammoid than in either *Eupellaea* or *Eunotholaena*.

Mettenius was well aware of the resemblance of *Cincinalis* and *Eunotholaena* in soral characters, and on the strength of it trans-

[1] Accepting Christensen's designation of *N. marantae* as type.

ferred both together to *Gymnogramma*.[1] Prantl, in placing, with much reasonableness, our group in *Pellaea*, suggested that Mettenius may have been right in treating *Eunotholaena* and *Cincinalis* as a unit and that the former as well as the latter ought to be transferred to *Pellaea*.[2] Our own feeling is that the final disposition of *N. nivea* and its allies—whether as a subgenus of *Notholaena* or of *Pellaea*, or as an independent genus, or as something we do not now foresee—must await a comprehensive and detailed study of all the *Cheilanthinae*. For the present, we leave them in their old conventional position under *Notholaena*.

In any case, Prantl was doubtless right in associating with our group the species usually known as *Pellaea formosa* (*P. pulchella*). It agrees in general habit, numerous, tiny pinnules, type of rhizome-scales, sori and spores. With it would go, of course, its close relative, *P. microphylla* Mett. But until generic affinities in the *Cheilanthinae* are better understood than at present, we are making no transfers.

Of the species and varieties here treated, those with white ceraceous indument have usually been referred to *N. nivea*. *N. tenera* and *N. flavens* have by most authors been regarded as distinct.

The characters in the synoptic, but somewhat artificial, key which follows are mostly comparative, and none of them, not even the difference in spores, are wholly constant. Plainly, the group is still plastic, its variants not completely separated. But, as here defined, they appear natural, and distinct enough to make their recognition desirable. Geographically, *N. nivea* and its varieties occupy the higher portions of the Andean region of South America from Ecuador southward to extreme northern Chile, passing into lower altitudes on the eastern slope of the Cordillera in northern Argentina, and with a few outlying stations in the highlands of eastern Brazil. If the data on Mutis's labels may be depended upon, var. *flava* has also an outlying station to the north, in Colombia. *N. incana* inhabits the highlands of central Mexico, extending southward into Guatemala, with a quite unexpected outpost in Santo Domingo. From the few collections at hand, *N. delicatula* appears to be confined to the eastern and western ranges of north-central Mexico.

We are indebted to the officials of the various herbaria listed below for loans and for the privilege of examining specimens under their care. Determinations of specimens in European herbaria

[1] See Mett. Cheil. 5–7 (1859).
[2] Prantl in Engl. Bot. Jahrb. iii. 417 (1882).

were made by the junior author; others are mostly joint. In citation, the following more or less standard abbreviations for names of herbaria are used: Berlin, (B); British Museum, (BM); Gray Herbarium, (G); Kew, (K); New York, (NY); Paris, (P); Philadelphia Academy, (Pa); Praha, (Pr); United States National Herbarium, (US); Yale University, (Y).

a. Indument white, ochroleucous, or none....*b.*
b. Indument present, white or ochroleucous....*c.*
c. Pinnules herbaceous, often cuneate at base, usually glandular on upper surface; lamina broadly deltoid, nearly or quite as broad as long, tri- to subquadripinnate; veins sporangiferous for nearly their whole length; spores rugose.....*N. delicatula*
c. Pinnules commonly coriaceous (if thinner, lamina distinctly longer than broad and bipinnate except near base), commonly truncate to subcordate at base, glabrous on upper surface; lamina longer than broad....*d.*
d. Stipe blackish; veins usually bearing sporangia for nearly their whole length; spores minutely and inconspicuously roughened.....*N. incana.*
d. Stipe castaneous; veins usually bearing sporangia in the outer third or half only; spores strongly rugose....*e.*
e. Lamina more or less completely tripinnate; ultimate pinnules suborbicular to broadly oblong, the simple lateral ones mostly less than 4 mm. long, the terminal often lobed; scales often strongly crisped in drying.....*N. nivea.*
e. Lamina bipinnate above, only imperfectly tripinnate as to lower pinnae; ultimate pinnules oblong, the lateral 4 mm. long or more, the terminal commonly simple; scales never strongly crisped.
N. nivea var. *oblongata.*
b. Indument none; lamina usually only bipinnate except toward base; scales not strongly crisped.....*N. nivea* var. *tenera.*
a. Indument bright yellow; stipe dark-castaneous; scales not crisped.....*N. nivea* var. *flava.*

NOTHOLAENA INCANA Presl, Rel. Haenk. i. 19, t. 1, fig. 2 (1825) excl. spec. Amer. merid. TYPE, Mexico, Haenke (Pr, seen; photo, G).

Gymnogramma candida Mett. Cheil. 6 (1859), non *Notholaena candida* (Mart. & Gal.) Hook. (1865). TYPE, *Schmitz* 231 from Valle de Mexico, at Berlin (seen; photo, G, US, BM).

Pellaea candida (Mett.) Prantl in Engl. Bot. Jahrb. iii. 417 (1882).

MEXICO.—CHIHUAHUA: *E. Palmer* 215 (BM, K, US); 115 (G, Y). SAN LUIS POTOSI: in montibus San Rafael, 1876, *Schaffner* 961 (G, K); 1851, *Virlet d'Aoust* 21 (P). DURANGO: *García* 790 (US). ZACATECAS: Plateado, Sept. 4, 1897, *Rose* 3740 (US).

Guanajuato: 1902, *Dugès* 12 (G). Hidalgo: Sierra de Pachuca, Sept. 1, 1903, *Rose & Painter* 6747 (US). Mexico: montes circa urbem Mexico, *Schmitz* (K); Valle de Mexico, *Schaffner* 234 (B, K, P), 262 (K); shaded banks near Ozumba, 8500 ft., Nov. 3, 1902 *Pringle* 11267 (B, G, K, US); barranca près Mixcoal, and Santa Fé, Sept. and Oct. 1865, *Bourgeau* 754 (G, K, P); dans les ravins entre San Angel et Miquac, *Schnee* (P); cliffs, Sierra de las Cruces, Oct. 23, 1892, *Pringle* 5248 (P); San Angel, Aug. 1875, *Schaffner* 28 (B); near Salazar, Sept. 14, 1903, *Rose & Painter* 7042 (US); Popo Park, Aug. 4–8, 1910, *Hitchcock* (US); Amecameca, July 29, 1924, *Fisher* 35 (US); Sierra de Ajusco, 8500 ft., Nov. 10, 1907, *Pringle* 15021 (G, US); near Santa Fé, along rocky banks of stream, Oct. 18, 1903, *Rose & Painter* 8001 (US); Cima de Toluca, 3000 m., Sept. 1925, *Lyonnet* 35 (G, US). Morelos: cool banks, Parque Station, 7500 ft., Oct. 16, 1909, *Pringle* 15698 (US); near Cuernavaca, Sept. 8, 1903, *Rose & Painter* 6872 (US). Tlaxcala: Sta. Ana Chiantempan, *Arsène* 1739, 1848 (P), s.n. (NY). Michoacan: Panguato près Morelia, 2000 m., Sept. 25, 1910, *Arsène* 5756 (US), 5341 (P). Puebla: Manzanillo, *Nicolas* (P); Hueyotlipam, June 15, 1908, *Arsène* 2145 (P); barrancas de l'Alseseca, Hacienda Batan, près Totimehuacan, 2120 m., Dec. 3, 1907, *Arsène* 1993 (P). Oaxaca: Monte Alban near Oaxaca City, 5500–6000 ft., *C. L. Smith* 2041 (US); sur les rochers en terre temporée, Sept. 1842, *Ghiesbreght* 415 (P); Cerro de San Felipe, 2000 m., Aug. 22, 1897, *Conzatti & Gonzalez* 463 (G). Chiapas: entre les rochers, 6500 pieds, *Ghiesbreght* 226 (G, K, Y).

Guatemala: without locality, *Salvin & Godman* (K); *Salvin* 238 (G); Quezaltenango, Aug. 1871, *Bernouilli & Cario* 251 (B, K, P).

Santo Domingo: face of cliffs, 2600 m., Pico del Valle Nuevo, prov. de la Vega, Cordillera Central, Oct. 15, 1929, *Ekman* 13770 (US).

The type sheet of *N. incana* (no. 78538 in the herbarium of the National Museum at Praha) contains a clump of typical *N. nivea* (three plants much matted together and rather badly battered) and three detached fronds of the Mexican species, two of them young and poorly developed and one in good fruiting condition. Presl's conventionalized drawing seems not to have been made directly from any of the specimens. His diagnosis is: "fronde ovato-triangulari triplicato-pinnata, apice bipinnata, pinnulis ellipticis rotundatisve subtus albo-farinosis, terminalibus et infimis subtrilobis, stipite rachibusque nitidis."

Except that the shape of the lamina could hardly have been made out from the matted mass of *N. nivea*, this is broad enough to cover both elements. His description is somewhat more specific. "Stipes brevis" does not apply to the specimens of *N. nivea*, but could have been drawn from the broken-off petioles of the Mexican material. "Stipes . . . fusco-nigricans" must have been taken from the latter. "Capsulae submarginales . . . dein confluentes et totam paginam inferiorem, costa excepta, obtegentes" presumably came from both elements, the first phrase from the South American, the latter from the fertile Mexican frond, which Presl evidently supposed represented the fully mature condition of his species.

N. incana, then, is validly published, and is attested by adequate type specimens. The South American element in it has a tenable name; the Mexican, which played a considerable though by no means exclusive part in shaping the diagnosis, has no available one. Under these circumstances it seems best to retain *N. incana* for the Mexican element, typifying it by the specimens on the lower part of the type sheet, and particularly by the fruiting lamina at the left.

The specimens from Santo Domingo are rather small and show some almost orbicular ultimate pinnules reminiscent of *N. nivea*, to which Christensen [1] referred them; but they have the dark stipes, elongated sori, and only minutely roughened spores characteristic of *N. incana*, and may safely be referred to that species.

Hispaniola has long been noted for the occurrence of species otherwise Andean and mostly of wide range along the Cordilleras. Instances of species turning up in Hispaniola that have been known previously only from the Mexican highlands are indeed few and far between.

Notholaena **delicatula,** sp. nov. Plerumque gracilis. Rhizoma breve erectum vel obliquum, frondes plures dense caespitosas emittens, paleis tenuibus brunneis concoloribus lineari-subulatis longe acuminatis circa 4 mm. longis 0.8 mm. latis integris, cellulis elongatis parietibus tenuibus, onustum. Stipes castaneus gracilis teres glaber subnitidus laminam subaequans. Lamina plerumque deltoidea fere aequilateralis tripinnata vel inferne subquadripinnata. Rachis costaeque stipiti similes. Pinnae majores circa 5-jugae remotae oblongae vel deltoideae petiolatae. Pinnulae structura pinnis similes remotae. Pinnulae ultimae in pedicellis brevibus castaneis articulatae tenuiter herbaceae 4 mm. vel minus

[1] Svensk. Vet. Akad. Handl. ser. 3, xvi. 59 (1937).

longae, pagina superiore minute glanduliferae, inferiore granis ceraceis albidis minutissimis discretis copiose praeditae, subintegrae vel minute irregulariterque crenatae, margine non revoluto; laterales oblongae vel ovatae vel inaequilateraliter rhomboideae, apice obtusae, basi subtruncatae vel late cuneatae; terminales vel eorum lobi centrales rhomboideae vel fere flabelliformes, saepe in basin angustam ex comparatione longam sicut petiolum abrupte contractae. Nervillae evidentes tenues liberae pinnatae 1–3-furcatae e costula angulo acuto egredientes, fere per totam longitudinem sporangiferae. Sporangia brevissime stipitata, annulo e cellulis circa 20 composito. Sporae brunneae sphaericae jugis tenuibus flexuosis fuscis rugosae, diametro ca. 50μ.

Mexico.—Coahuila: Lerios, 45 miles east of Saltillo, July 1880, *E. Palmer* 1387 (type in U. S. Nat. Herb., sheet no. 60365; isotypes, G, K, P, Y); Sierra Madre, 40 miles east of Saltillo, March 1880, *Palmer* 1385 (G, US, Y). Nuevo León: Monterrey, 1880, *Palmer* 1386 (G, P, US; a juvenile state with dilated segments; see discussion below). Jalisco: limestone ledges, mountains near Monterrey, June 1889, *Pringle* 2581 (B, BM, G, K, P, US, Y).

Notholaena delicatula differs from *N. incana* in its paler stipes, delicate texture and rugose spores; from *N. nivea* in texture and usually more elongate sori; and from both in its broader lamina, its stronger tendency toward cuneate-based ultimate pinnules, and its generally glandular upper surface. *Palmer* 1385, though otherwise in agreement with the type, is of thicker texture and has the upper surface nearly glabrous.

We are in doubt regarding two collections from the Sierra Madre Oriental of Nuevo León (*C. H. & M. T. Mueller* 628 and 1115). In their castaneous stipes and somewhat rugose spores they suggest *N. delicatula*, from which they differ notably, however, in their greater size, glabrous upper surface, and more copious waxy covering beneath. In general appearance they agree with *N. incana* and may be placed there temporarily, in spite of their castaneous stipes.

Notholaena nivea (Poir.) Desv. Journ. Bot. Appl. i. 93 (1813).

Pteris nivea Poir. Encycl. v. 718 (1804). Type from Peru, Jos. Jussieu, sheet no. 1047 in herb. Jussieu at Paris; seen.

Acrostichum albidulum Cav. ex Sw. Syn. Fil. 16, 205, t. 1, fig. 2 (1806). Type not seen, but apparently belonging here.

Cincinalis nivea (Poir.) Desv. Berl. Mag. v. 313 (1811).

Notholaena albidula (Cav.) Sturm, Pl. Vasc. Crypt. Chile, 16 (1858).

Gymnogramma nivea (Poir.) Mett. Cheil. 7 (1859).

Pellaea nivea (Poir.) Prantl, in Engler, Bot. Jahrb. iii. 417 (1882).

Representative specimens. ECUADOR: in rupium apricarum fissuris secus oppidum Huano, Dec. 1858, *Spruce* 5632 (B, BM, G, K, NY, P); Berg am Rio Ambato, erloschenen Volkan trockener kalkhaltiger Sandboden, selten, Nov. 2, 1932, *Erica Heinrichs* 36 (B, NY); in altiplanitie ad rupes prope Pifi, 2600 m., 1897, *Mille* (US); same locality, Sept. 1902, *Mille* 171 (P).

PERU.—ANCACHS: zwischen Samanca und Caraz, 3700 m., May 24, 1903, *Weberbauer* 3061 (B); Caraz, May 19, 1903, *Weberbauer* 3009 (B). HUANUCO: in Andium montibus, *Ruiz* 45 (B). LIMA: Matucana, April 19, 1878, *Savatier* 1215 (K); same locality, *Macbride & Featherstone* 425 (US); Puruchuca, *Mathews* 755 (K, P); Oroya Railroad, *Steere* (G, P), *Safford* 990 (G, P, NY, US), *Weberbauer* 135 (B); open hillside, Rio Blanco, 3000–3500 m., April 15–17, 1929, *Killip & Smith* 21561 (G, NY, US). JUNÍN: open hillside, Tarma, 3000–3200 m., April 20–22, 1929, *Killip & Smith* 21812 (US, NY); open, rocky hillside, Mantaro Canyon, 3150 m., April 29, 1929, *Killip & Smith* 22161 (US). CUZCO: offen aber stellenweise dichte Formation, gemischt aus Kräutern (Gräser zahlreich), kleiner Sträuchern und stachelblattrigen stammbildenden Bromeliaceen, Cacteen sehr sparlich vertreten, felsige Stellen, 3500–3600 m., Cuzco, May 25, 1905, *Weberbauer* 4866 (B); dry, rocky cliff above Ollantaitambo, 3600 m., Nov. 29–Dec. 6, 1923, *Hitchcock* 22528, 22549 (US); Calca, 3000–3200 m., Oct. 1924, *Herrera* 144 (US); walls of temple of Viracocha near Tinta, 3500 m., April 15, 1915, *Cook & Gilbert* 196, 221 (US).

BOLIVIA: canyon of La Paz River, Aug. 6, 1920, *Shepard* 181 (G, NY, P, US); La Paz, 3300 m., *Buchtien* 600 (NY, US), *R. S. Williams* 2631 (NY, US), *Rose* 18917 (NY, US), *Cárdenas* (Mulford Exp.) 47 (G, NY), *Bang* 19 (B, BM, G, K, NY, P, US), 2600 (G, NY, US), *Pflanz* 73 (B), *Rusby* 324 (US); beneath stones or bushes, Chorolque, Dept. Potosí, 3500 m., Dec. 1931, *Cárdenas* 141a (G); Escayache bei Tarija, 3600 m., Jan. 31, 1904, *Fiebrig* 3024 (B, BM, G, K, P, US); Pazna, 4200 m., May 1908, *Buchtien* 1142 (US); La Tetilla bei Oruro, 4000 m., *Stübel* 1221 (B); vicinity of Oruro, Aug. 18, 1914, *Rose* 18935 (NY, US); Cerro de Oruro, 3900 m., Sept. 1911, *Herzog* 2446 (US); Cochabamba, 3000 m., May 26, 1892, *Kuntze* (B, NY); Serro Macho, Dept. Sucre, April 1933, *Cárdenas* 492 (G).

CHILE.—TARAPACÁ: Sibaya, *Philippi* (B, K); Quebrada de Quipisca, Noasa, 3500 m., March 1926, *Werdermann* 1068 (B, K, NY, US).

ARGENTINA.—SALTA: Nevada del Castillo, March 19–23, 1873, *Lorentz & Hieronymus* 53 (B, US); Cuesta del Acay, Dec. 2, 1923, *Catalano* 25/1512 (G). Los ANDES: El Fronton, 3850 m., March 1926, *Catalano* 2 (G); Susques, March 5, 1927, *Castellanos* (G); Chorillos, March 1930, *Budín* 7 (G). TUCUMÁN: Cuesta de la Puerta de San Zavier, Feb. 1874, *Lorentz & Hieronymus* 955 (B). CATAMARCA: coteaux arides, Quebrada de el Tala, 550 m., April 12, 1910, *Castillon* (G, P); La Franca, Feb. 4, 1930, *Castellanos* 30/313 (G). LA RIOJA: Sierra Famatina, Jan. 29, 1879, *Hieronymus & Niederlein* 555 (B); LaFrancia, Feb. 4, 1930, *Castellanos* (G). CÓRDOBA: Huerta Grande, Sierra Chica, Feb. 17, 1897, *Stuckert* 1764 (P). SAN JUAN: Quebrada del Paramillo, Medanos, Jan. 1876, *Echegaray* (B).

There is a good deal of variation in the texture of the rhizome-scales in typical *N. nivea*. In the type specimen and in numerous other collections, especially from the northern part of its range, they are delicate and more or less tortuous, with irregular marginal projections, and in drying are so crisped and drawn together over the apex of the rhizome as to appear like a miniature ball of crumpled tissue-paper. In other specimens, especially from the southern part of the range, the scales are of more substantial consistency, less tortuous and only slightly crisped or merely somewhat twisted in drying. Notwithstanding this tendency toward geographic alignment, there is every intermediate stage between the two extremes; there are no essential differences in the structure of the scales, and no correlating characters.

NOTHOLAENA NIVEA (Poir.) Desv. var. OBLONGATA Griseb. Symb. Fl. Argent. 342 (1879). Type not designated, but said to be from Salta; a specimen at Kew labelled "comm. Grisebach, 1878" is taken as authentic.

PERU.—CUZCO: Feb. 1938, *Soukup* 76 (G). APURIMAC: Andahuaylas, 1800 m., March 1928, *Herrera* 1498 in pt. (G). PUNO: Macusanai, in rupibus umbrosis, June 1854, *Lechler* 1830 (B).

ARGENTINA.—TUCUMÁN: saxicola, 2700 m., Sierras Colchaquias, Jan. 20, 1933, *Burkart* 5168 (G); Villa Nougues, Famailla, Jan. 1922, *Venturi* 1649 in pt. (G, US; white indument scant, approaching var. *tenera*). CATAMARCA: coteaux arides, Ambato, April 12,

1910, *Castillon* (G, P); Dept. Andalgalá, Jan. 24, 1917, *Jörgensen* (US). Córdoba: *Lossen* 242 (Pa; with very sparse indument, as well referable to var. *tenera*).

Brazil.—Santa Catharina: San Joaquim, 1000 m., *Spannagel* 172 (NY, Pa).

Except for the single outlying station in Brazil, var. *oblongata*, though apparently uncommon, shows no marked geographic segregation and possibly should be regarded as a growth-form. From the scanty material seen, however, it appears not to be a developmental stage; and its strong tendency to perfectly imparipinnate leaf-form, together with the absence of the strongly crisped rhizome-scales frequent in typical *N. nivea*, seem to justify Grisebach's treatment. In general habit it is transitional to var. *tenera*, though in the narrowness of its segments it goes beyond that variety.

Notholaena nivea (Poir.) Desv. var. tenera (Gill.) Griseb. Symb. Fl. Argent. 342 (1879).

N. tenera Gill. ex Hook. in Curtis, Bot. Mag. sub. t. 3055 (1831). Type at Kew, a cultivated specimen grown from spores sent by Gillies from Argentina.

Pellaea nivea f. *tenera* (Gill.) Hieron. in Engler, Bot. Jahrb. xxii. 390 (1896).

Peru.—Lima: in convalle fluminis Rimac ad 8000 ped., May 1882, *R. Ward* (K); rochers, Matucana, April 21–22, 1877, *Savatier* 589 (K), April 12–May 3, 1922, *Macbride & Featherstone* 82 (G); Oroya Railroad, Oct. 26, 1901, *Steere* (G, P, Y), *Safford* 992 (US); Rio Blanco, 3000–3500 m., April 15–17, 1929, *Killip & Smith* 21578 (NY). Junin: crevices of bare rock, Mantaro Canyon, April 29, 1929, *Killip & Smith* 22162 (NY, US). Cuzco: Sept. 1, 1914, *Rose* 19471 (US); pueblo de Gucay, Urubamba, Aug. 1925, *Herrera* 717 (US).

Bolivia: in scopulosis, vic. Sorata, 2700–3000 m., Feb.–April 1859, *Mandon* 1550 (BM, G, K, NY, P), *Mandon* 1863 (B), *Rusby* 326 (G, NY, US); La Paz, April 1885, *Rusby* 327 (NY, US); Cochabamba, 2600 m., 1932, *Bro. Julio* II 234 (US); Pazna, 4200 m., May 1908, *Buchtien* 1141 (US); Cotaña am Illimani 2450 m., Nov. 1911, *Buchtien* 3112 (G, US); Miraflores, Potosí, among calcareous rocks, 3800 m., March 1932, *Cárdenas* 141a, 141b (G).

Argentina.—Jujuy: sobre las peñas, Volcán, 2400 m., Feb. 17, 1927, *Venturi* 4931 (G, US); entre los cerros, entre cactus, 2500 m.,

Tilcara, Feb. 1936, *A. G. Schulz* 974 (G). TUCUMÁN: Cienaga, *Lorentz* 888 (B); Famailla, Quebrada de Lulas, Nov. 21, 1920, *Venturi* 1064 (G, US); Cerro del Campo, Burroyaco, 2000 m., en las peñas, April 12, 1930, *Venturi* 10369 (NY). CATAMARCA: Yacutula, Dec. 1879, *Schickendantz* 44 (P), 364 (B); El Candado, Feb. 20, 1916, *Jörgensen* 1237 (G). LA RIOJA: en las cercanias de la mina del Oro, Sierra Famatina, Jan. 23–25, 1879, *Hieronymus & Niederlein* 439 (B), 732 (B), Jan. 25, 1928, *Castellanos* 28/19 (G). CÓRDOBA: 1879, *Stuckert* 5971 (P), Dec. 1891, *Kuntze* (NY). MENDOZA: hauteurs audessous de Rio Tigre près San Rafael, 1200 m., Feb. 4, 1897, *Wilchek* 2 (P). BUENOS AIRES: Sierra de Ventana, Jan. 1896, *Bettfreund* 1006 (B).

Var. *tenera* shows a strong tendency to a narrow lamina, bipinnate only, except toward the base. In color of stipe it is somewhat variable; most specimens have the comparatively light castaneous stipes of typical *N. nivea*, but in some they are quite as dark as in var. *flava*. This, together with Hieronymus's specimens, in which the habit of var. *tenera* is combined with sparse yellow or sometimes with sparse white indument, suggests that var. *tenera*, as here defined, may include glabrate derivatives from both the typical variety and var. *flava* or crosses with them.

Occasional specimens show a tendency toward the oblong pinnules characteristic of var. *oblongata*. Such are:

PERU: Oroya Railroad, Oct. 26, 1901, *Steere* (P, Y). ARGENTINA: Sierra de Catamarca, Jan. 1888, *Schenck* 14 (B); Sierra Famatina, La Rioja, Jan. 1879, *Hieronymus & Niederlein* 439 (B), *Castellanos*, Jan. 1928 (G).

This tendency, however, is much less clearly marked than in var. *oblongata* and, though it somewhat weakens the standing of that variety, seems itself to require no taxonomic recognition.

NOTHOLAENA NIVEA (Poir.) Desv. var. FLAVA Hook. Sp. Fil. v. 112 (1864). No type designated, nor specimens cited, but identity clear.

Acrostichum flavens Sw. Syn. Fil. 16, 204 (1806). Type from South America, *Née*, presumably at Stockholm. Not seen, but identity scarcely to be doubted.

A. tereticaulon Desv. Berl. Mag. v. 310 (1811). Type at Paris, "Amer. aequinoct.," probably from Peru; seen.

Cincinalis (?) *flavens* (Sw.) Desv. Berl. Mag. 329 (1811).

Gymnogramma flavens (Sw.) Kaulf. Enum. 77 (1824).

Notholaena chrysophylla Kl. in Allg. Gartenzeit. xxiii. 265 (1855).

Type at Berlin, a garden specimen, said to have come originally from Peru (*Warszewicz*); seen.

Notholaena flavens (Sw.) Moore, Ind. Fil. LXX (1857).

Pellaea nivea forma *flavens* (Sw.) Hieron. in Engl. Bot. Jahrb. xxii. 390 (1896).

Pellaea flavens (Sw.) C. Chr. Ind. Fil. 480 (1906).

COLOMBIA: *Mutis* 2102, 2104 (US).

ECUADOR: Loja, *Seemann* (K); Quito, 1896, *Sodiro* (P) (a form in habit approaching var. *oblongata*).

PERU.—HUANUCO: clefts of rocks, etc., on dry hills, April 1863, *Pearce* (K). LIMA: loose, rocky embankment, Piedra Grande, near Santo Domingo, May 14–19, 1923, *Macbride* 3706 (US). Without definite locality: 1835, *Mathews* 755 (K); *Dombey* (P).

BOLIVIA: Espia, head of Bopi River, 3500 ft., July 23, 1921, *White* (Mulford Exped.) 619 (K, NY, US), *Rusby* 143 (NY); Cintí, Dept. Chuquisaca, Jan. 1846, *Weddell* 3918 (P); descent from Taca to Chuncamayo, Yungas, 2000 m., Dec. 11, 1876, *Stübel* 1228 (B); Musu Mts., 3500 ft., Jan. 11, 1902, *R. S. Williams* 1366 (US); Tarija, Jan. 2, 1928, *R. E. Fries* 1225 (G), 2000 m., July 1932, *Cárdenas* 141 (G).

ARGENTINA.—JUJUY: on old wall, Feb. 1864, *Pearce* (BM, K). SALTA: zwischen Salta und Campo Santo, April 1873, *Lorentz & Hieronymus* 209 (B, US). TUCUMÁN: Vipos, 850 m., Oct. 1921, *Venturi* 1386 (G, US); en las barrancas, 1100 m., Molle de Castilla, Feb. 7, 1927, *Venturi* 5138 (US). CATAMARCA: Capital, Choya, 550 m., May 17, 1910, *Castillon* (G, P). LA RIOJA: Vilgo, April 3, 1906, *Uniche* (B). CÓRDOBA: Dec. 12, 1896, *Stuckert* 11714 (P); Jan. 26–27, 1876, *Hieronymus* 270 (B).

BRAZIL.—MINAS GERAES: an Felsen des Campos São Julião, *Schwacke* 12764 (P); Miguel Burnier, Preto, *Damazio* 1728 (NY, US).

Like var. *tenera*, var. *flava* shows an occasional individual approaching var. *oblongata* in habit—for instance, Quito, Ecuador, 1896, *Sodiro* (P). But, as in var. *tenera*, the tendency is slight and not clearly marked. Except that var. *flava* has outlying stations in Colombia and in the highlands of eastern Brazil, none of the varieties have a distinctive range.

Hieronymus, when in Argentina, became interested in this group and, with his colleagues, collected it intensively. He brought together a considerable series of specimens, now at Berlin, which he considered intermediate among *N. nivea*, *N. flavens*, and

N. tenera (as they were then generally called), and which he duly cited and discussed in his Beiträge zur Kenntniss der Pteridophyten-flora der Argentina (in Engler, Bot. Jahrb. xxii. 390–391). Some of them appeared to the junior author, who saw them at Berlin in 1937, reasonably referable to one or another of the groups here recognized and they are so cited by us. The residue is, however, sufficient to prove the existence of stages transitional in habit and in quantity and color of indument and is supported by similar collections from other sources. The following may serve as examples: Peru, *Wilkes Exped.* (Y), habit of typical *N. nivea*, but glabrous; Choya, Catamarca, Argentina, May 17, 1910, *Castillon* (G, P), good var. *tenera*, except that some fronds have more or less white indument; Quebrada del Salado, San Luis, Argentina, *Galander* (B), with both white and yellow indument on the same fronds. From such evidence Hieronymus concluded that *N. flavens* and *N. tenera* were without adequate taxonomic basis, and reduced both to formal rank under *N. nivea*. This was rather extreme. His opinion that neither the absence of indument nor its color constitutes a character of specific importance in this subgroup of variable forms is sound; but he took too little account of the rather vague but actual correlative tendencies in habit, color of stipe, and texture of scales. Grisebach was more nearly correct, as we see it, in treating *N. tenera* as a variety of *N. nivea*; but he gave too much importance to color, and maintained *N. flavens* as a species. The treatment here adopted, the recognition as varieties of four rather slightly characterized and variable trends, not yet fully disentangled in the course of evolution, seems most accurately to express the facts of nature.

One other type of variation remains to be discussed. In three of the varieties of *N. nivea* and in the Mexican *N. delicatula* there occur occasional individuals of very different aspect from the normal. Mostly these are small plants, with narrow blades; the terminal segments of the pinnae are much dilated laterally (up to 8 mm. wide by 6 mm. long) and more or less lobed, and the lateral segments are somewhat developed in the same manner. Such specimens are: near Salta, Argentina, April 1873, *Lorentz & Hieronymus* 209 (B, K, P—cited by Hieronymus as an intermediate between var. *tenera* and var. *flava*); Quebrada de la Tala, Catamarca, Argentina, Nov. 1872, *Hieronymus & Lorentz* (B); Prov. Cintí, Dept. Chuquisaca, Jan. 1846, *Weddell* 3918 (P—showing fronds with dilated and normal segments on the same indi-

vidual); Monterrey, Nuevo León, Mexico, *Palmer* 1368 in 1880 (G, P, US—the Paris specimen with both types of fronds from the same rhizome).

The condition just described seems to be a juvenile phase, sometimes partially fertile, analogous to the very large and strangely shaped leaves often to be found in saplings and on new shoots of deciduous-leaved trees. Indeed, the occurrence of both types of lamina on the same rhizome hardly allows any other interpretation.

II. New Species.

Notholaena **peninsularis,** sp. nov. Rhizoma breve horizontale vel adscendens, frondes plures laxe caespitosas ad 4 dm. altas emittens, paleis concoloribus castaneis vel pallide brunneis tenuibus siccitate tortis lineari-subulatis longe acuminatis integris ad 5 mm. longis 0.6 mm. latis e cellulis elongatis parietibus tenuibus compositis onustum. Stipes teres nigrescens vel saturate castaneus nitidus inferne plus minusve paleaceus, paleis eis rhizomatis similibus nisi minoribus. Lamina ovata vel ovato-lanceolata usque ad 25 cm. longa et 8 cm. lata bipinnato-pinnatifida, basi paullo angustata (pinnarum jugo infimo leviter reducto), ad apicem obtusum gradatim vel subabrupte angustata, pagina superiore sparse et minutissime ceraceo-glandulosa, inferiore dense albo-ceracea. Rachis stipiti similis, plus minusve ceraceo-glandulosa, paleis parvis tenuibus lineari-acuminatis sparse obsita. Pinnae remotae ad decem-jugae imparipinnatae lineari-lanceolatae vel oblongae pleraeque 3–6 cm. longae obtusae petiolatae, costa rachi simili. Pinnulae ad 7-jugae remotae, apicales subsessiles, ceterae in petiolulis brevibus nigrescentibus articulatae, oblongo-ovatae vel majores deltoideae, basi truncatae vel subcordatae, apice obtusae, plus minusve profunde lobatae vel pinnatifidae seu basi pinnatae, lobis 2–4-jugis plerumque oblongis obtusis integris vel minute crenulatis, infimis tantum subinde liberis et leviter lobatis vel latere inferiore basi auriculatis. Costa e basi viridis. Venulae liberae pinnatae obliquae 1–2-furcatae, in frondibus fertilibus sporangia in linea unica per 3/4 longitudinem gerentes, marginem crassum vix attingentes. Sporangia brevissime stipitata, annulo angusto rubro-brunneo a cellulis ca. 20 composito. Sporae triplanatae pallide brunneae diametro circa 45μ levissime asperatae vel fere laeves.

Mexico.—Baja California: Sierra de la Laguna, from San Bernardo to El Sanz, alt. 3500 ft., Jan. 21, 1906, *Nelson & Gold-*

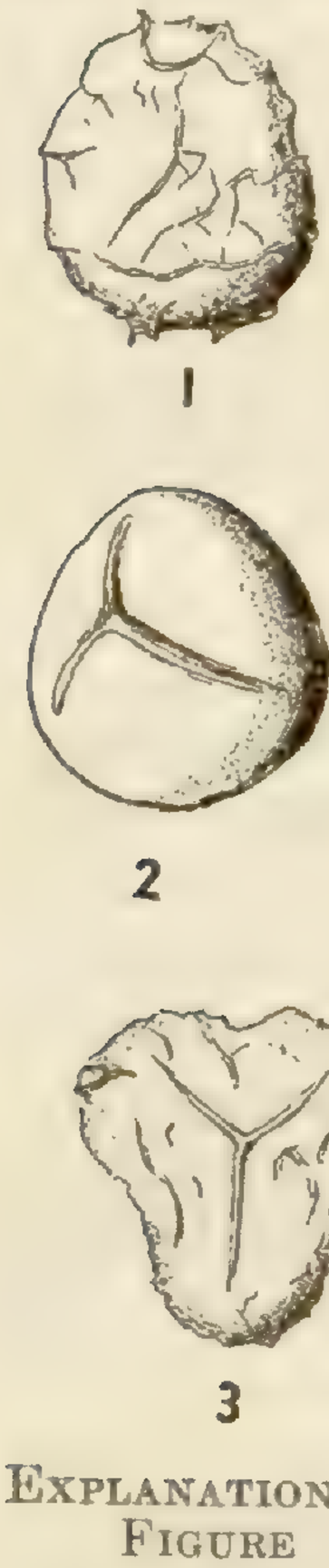
man 7430, TYPE, U. S. Nat. Herb. 565505. Sierra de la Laguna, Jan. 21, 1890, *Brandegee* (G), *Brandegee* 656 (US), Jan. 23, 1890, *Brandegee* 650 (G, NY); Jan. 24, 1890, *Brandegee* (US); Cota Ranch, Laguna Mts., 14 miles east of Todos Santos, Feb. 21, 1928, *M. E. Jones* 24154 (NY).

N. peninsularis is most nearly related to *N. incana*, from which it differs as follows:

Lamina essentially bipinnate-pinnatifid, only the lowest lobes of the pinnules sometimes free, the lobed portion then occupying half the length of the pinnule or more; rachis more or less glandular and bearing a few small scales .....*N. peninsularis.*

Lamina bi- to tripinnate; pinnules simple and entire to fully imparipinnate, the terminal segment, if lobed, occupying less than half the length of the pinnule; rachis glabrous and without scales .....*N. incana.*

From all other members of the group of *N. nivea*, *N. peninsularis* is distinguished by its less divided lamina, its somewhat glandular rachis bearing a few small persistent scales, and its nearly smooth spores. From species in other groups of *Notholaena* it is separated by characters of habit, sori, and indument.



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EXPLANATION OF FIGURE

1. Spore of *Notholaena delicatula*, from *Pringle* 2581, × 300. 2. Spore of *Notholaena incana* from *Pringle* 11267, × 330. 3. Spore of *Notholaena Lumholtzii*, from *Hartman* 298, × 250.

NOTHOLAENA **Lumholtzii,** sp. nov. Rhizoma breve erectum, frondes plures ad 12 cm. longas dense caespitosas emittens, paleis lineari-ligulatis longe acuminatis circa 4 mm. longis 0.4–0.5 mm. latis integris tenuibus siccatis plus minusve crispatis rufo-brunneis concoloribus e cellulis elongatis parietibus tenuibus compositis dense onustum. Stipes quam lamina brevior gracilis teres nigra plus minusve glauca glabra. Lamina deltoideo-lanceolata vel deltoideo-ovata 7–8 cm. longa 5–7 cm. lata ut videtur bipinnata tantum, apicem versus pinnata, nulla parte pinnatifida. Rachis costaeque stipiti similes. Pinnae suboppositae vel alternae remotae circa 7-jugae oblongae, basales 2.5–3.5 cm. longae, perfecte imparipinnatae. Pinnulae herbaceae vel subcoriaceae remotae omnino simplices nec lobatae glabrae glauco-virides integrae, terminales deltoideae 5–7 mm. longae et latae e basi truncato vel late cuneato in apicem obtusum aequaliter angustatae, laterales 1–4-jugae

plerumque oblongae vel deltoideo-ovatae obtusae breviter petiolulatae obscure articulatae, marginibus herbaceis nec hyalinis leviter vel nullo modo revolutis. Nervatio pinnata, venulis liberis e costula basin versus nigrescente superne viridi angulo acuto egredientibus 1–3-furcatis, ramulis ultimis apicem versus (venulae longitudinis ad quartam partem) leviter incrassatis sporangiferis, soros angustos sublineares formantibus. Sporangia brevissime stipitata, annulo brevi ex comparatione lato e cellulis 10–13 composito. Sporae circumscriptione circulares vel obtuse subtrilobatae ad 72μ diametro, jugis tenuibus humilibus brevibus fuscis flexuosis vel fere rectis sparsis leviter asperatae.

MEXICO.—SONORA: Huehuerachi, 4000 ft. alt., Dec. 7, 1900, *Hartman* (Lumholtz Exped.) 298 (G, US, TYPE); same locality, Dec. 20, 1890, *F. E. Lloyd* (Lumholtz Exped.) 489 (G).

N. Lumholtzii is probably most nearly related to *N. Jonesii* Maxon, from which it differs in its relatively slender, black, somewhat glaucous stipe and rachis, its strictly bipinnate habit, without pinnatifid tip or lobed terminal segment at the apex either of the lamina or the pinnae, and the shape, size, and texture of the pinnules. From *Pellaea microphylla*, which it suggests in its strictly imparipinnate habit, it differs in the color of stipe and rachis, the simpler architecture of the lamina, the non-cordate bases of the pinnules, and the only lightly rugose spores.

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2. STUDIES IN THE BROMELIACEAE,—X.

BY LYMAN B. SMITH.

Pitcairnia biflora, spec. nov., e fragmentis solum cognita, florifera 4 dm. alta; folio unico cognito 4 dm. longo, integro, longe petiolato, petiolo gracillimo, sparse pallido-lepidoto; lamina linearilanceolata, 22 mm. lata, filiformi-acuminata, glabra, subtus pallida; scapo gracillimo, sparse lepidoto, rubro; scapi bracteis valde remotis, late ovatis, acuminatis; inflorescentia laxe biflora; bracteis florigeris late ovatis, acuminatis, membranaceis, rubris, quam pedicellos bene brevioribus; pedicellis gracilibus, 1–2 cm. longis; floribus erectis, glabris; sepalis anguste ellipticis, obtusis, 25 mm. longis, ecarinatis; petalis angustis, obtusis, 6 cm. longis, basi ligulatis, rubris vel albis; ovario 2/3 supero; ovulis caudatis. Tab. I, fig. 1–3.

PERU: San Martin: in semi-shade, Jesus del Monte, near Moyobamba, alt. 900 m., Aug. 1938, *Sandeman s.n.* (Kew, type; phot. G).

Owing to the scantiness of the material it is not possible to tell whether or not the leaves are dimorphic, but in either case *Pitcairnia biflora* is quite unlike any previously known species. It seems most nearly related to *P. subpetiolata*, but not very close to that.

Pitcairnia patentiflora, spec. nov., acaulis, florifera metralis; foliis homomorphis, subbulbose rosulatis, 3–7 dm. longis, vaginis late ovatis, ca. 2 cm. latis, laminis angustissime triangularibus, acuminatis, 13 mm. latis, juvenile utrinque pruinose albido-lepidotis, dentibus gracilibus rectis ad 2 mm. longis laxe armatis; scapo gracili, glabro; scapi vaginis infimis foliaceis, internodia superantibus, supremis lanceolatis, integris, quam internodia multo brevioribus; inflorescentia laxe subtripinnatim paniculata, glabra; bracteis primariis lanceolatis, haud ultra 15 mm. longis; ramis laxissime racemosis, ad 12 cm. longis; bracteis florigeris lanceolatis, acutis, 5 mm. longis; floribus patentibus; pedicellis gracilibus, 15 mm. longis; sepalis angustissime triangularibus, acuminatis, 2 cm. longis; petalis linearibus, acutis, quam sepala paulo longioribus, rubris, nudis; ovario 2/3 supero; ovulis alatis.—*P. nuda* Bak. sensu L. B. Smith in Bull. Torr. Bot. Club, lviii. 340 (1931), non Bak. (1881). Tab. I, fig. 4.

VENEZUELA: Amazonas Territory: rocky top of Esmeralda Ridge, Esmeralda, alt. 100 m., Oct. 1928, *G. H. H. Tate 213* (NY, type; phot. G).

This species is distinguished from *Pitcairnia nuda* and *P. pruinosa* by its short petals and from *P. tarapotensis* by its homomorphic leaves. *Tate 857* from the summit of Mt. Duida closely matches the leaves of *P. patentiflora* but is sterile so that its identity is not certain.

Tillandsia capitata Griseb. var. **guzmanioides,** var. nov., acaulis, florifera ad 5 dm. alta; foliis cyathiformi-rosulatis, inflorescentiam subaequantibus, minutissime denseque lepidotis; vaginis magnis, ellipticis, atro-castaneis; laminis anguste triangularibus, longe acuminatis, planis, ca. 2 cm. latis; scapo leviter curvato, 6 mm. diametro, glabro; scapi bracteis foliaceis, dense imbricatis, supremis inflorescentiam superantibus; inflorescentia perdense ellipsoidea, 8 cm. longa, bipinnatim paniculata; bracteis primariis eis scapi similibus sed brevioribus, spicis axillaribus bene occultantibus; spicis bifloris, basi bracteas steriles binas late alatas

gerentibus; bracteis florigeris ovatis, acutis, sepala subaequantibus, carinatis, membranaceis, dense adpresseque brunneo-lepidotis; sepalis lanceolatis, acutis, ad 27 mm. longis, membranaceis, dense lepidotis; petalis 35 mm. longis, verisimiliter tubulose imbricatis; staminibus ignotis. Tab. I, fig. 5–7.

MEXICO: CHIAPAS: Mt. Tacana, alt. 2000–4038 m., Aug. 1938, *Matuda 2308* (G, TYPE; Mich.).

This variety differs from typical *Tillandsia capitata* in its densely lepidote sepals, but as *T. capitata* in rare instances shows a very few scales on the sepals, it seems best now not to call the Matuda plant a distinct species. A full description is given in case further collections should make the differences seem stronger than varietal. The variety also shows a tendency to brown rather than gray indument and to strict rather than recurving primary bracts.

Tillandsia dasyliriifolia Bak. in Journ. Bot. xxv. 304 (1887); L. B. Smith in North American Flora, xix. 127 (1938).

The type locality of this species was given originally as "Holbox Island, Bay of Honduras," and has usually been cited since as from Honduras. Actually Holbox Island is off the northeast corner of Yucatan. The error lies in the use of an incorrect printed label for Gaumer's collections of 1886. As Hemsley shows in his Biologia Centrali-Americana, iv. 111, Gaumer collected on the islands of Holbox, Mugeres, Cozumel and Ruatan. These islands are listed from north to south, presumably in the order that Gaumer visited them, and Ruatan is the only one of the four that is off the coast of Honduras.

Catopsis triticea, spec. nov., dioica, acaulis, florifera 2–3 dm. alta; foliis 8–12 cm. longis, obscure punctulato-lepidotis, anguste albido-marginatis; vaginis ellipticis, magnis; laminis anguste triangularibus, acuminatis, basi ca. 15 mm. latis; scapo erecto, gracili, elongato, folias longe superanti; scapi bracteis imbricatis, late ovatis, caudatis vel apiculatis; plantae masculinae inflorescentia 6.5 cm. longa, basi pauperrime ramosa; bracteis primariis ovatis, apiculatis, quam spicas axillares bene brevioribus; spicis densis; bracteis florigeris ovatis, acutis, rectis, sepala subaequantibus, valde nervatis; floribus ad 10 mm. longis; sepalis bene asymmetricis, oblongis, extensis 9 mm. longis; petalis ad 3 mm. exsertis; staminibus valde inaequalibus; plantae femineae inflorescentia simplicissima, densa, 6–8 cm. longa; bracteis florigeris 12 mm. longis, sepala superantibus; floribus ad 13 mm. longis; sepalis

latissime obovatis, asymmetricis, 10 mm. longis; stylo 1 mm. longo. Tab. I, fig. 8–10.

MEXICO: Chiapas: Mt. Ovando, alt. 1250–2370 m., July 1938, *Matuda 2570* (Mich., type; G).

In my treatment in the North American Flora, staminate plants of *Catopsis triticea* run down to the vicinity of *C. Wangerini*. They differ from *C. Wangerini* in their elongate scapes, subsimple inflorescence and larger flowers. Pistillate specimens run down to the vicinity of *C. cucullata*, from which they differ in their erect inflorescence and straight floral bracts.

Nidularium rubrum Beer var. **albiflorum,** var. nov., corolla omnino alba, ex sicco ad 32 mm. longa.

BRAZIL: São Paulo: São Paulo, Feb. 1938, *Doering in Inst. Biol. S. Paulo 39201* (S. Paulo, type; phot. G).

Explanation of Plates.

Plate I.

Fig. 1. Pitcairnia biflora L. B. Smith (*Sandeman s.n.*), leaf × ½.
Fig. 2. Same, upper scape and inflorescence × ½.
Fig. 3. Same, expanded sepal × 1.
Fig. 4. Pitcairnia patentiflora L. B. Smith (*Tate 213*), flower × 1.
Fig. 5. Tillandsia capitata Griseb. var. guzmanioides L. B. Smith (*Matuda 2308*), inflorescence × ½.
Fig. 6. Same, spike × 1.
Fig. 7. Same, posterior sepals × 1.
Fig. 8. Catopsis triticea L. B. Smith (*Matuda 2570*), pistillate plant × ¼.
Fig. 9. Same, flower × 1.
Fig. 10. Same, expanded sepal × 1.

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3. PLANTAE MEXICANAE,—I.

By Lyman B. Smith and Bernice G. Schubert.

The paper here presented is the first in a proposed series of studies on Mexican plants. It is the purpose of the authors to publish in this form, from time to time, notes on species previously described but poorly defined or misunderstood, or descriptions of new entities, with illustrations wherever possible.

In this paper new species of *Cassia*, *Brongniartia*, *Begonia*, *Ipomoea* and *Breweria* are presented and reidentification is made of an early-described *Begonia*. The larger number of new species is described from material collected by Mr. G. B. Hinton, although

two of the *Begonia* species are typified by Guatemalan material collected by Mr. A. F. Skutch.

The authors are indebted to Dr. W. R. Maxon of the United States National Herbarium and Dr. C. C. Gregg of the Field Museum of Natural History for the generous loan of type specimens for comparison.

CASSIA **stenosepala,** spec. nov., fruticosa (?), 1.5 m. alta; caule lineato, sparse strigoso, cum pilis basi tumidis; foliis petiolatis, 6–9 cm. longis; petiolo 2–3 cm. longo; rhachi valde lineata, sparse strigosa, cum glandula unica clavata; stipulis bracteisque mox deciduis, ignotis; petiolulis 2.6 mm. longis, sparse strigosis; foliolis 2–4-jugis subellipticis, superne glabris, subtus moderate longo-strigosis, marginibus ciliatis, apice obtusis, mucronatis, basi parum attenuatis; inflorescentia racemosa sparse pilosa, ca. 15 cm. longa; pedicellis floriferis 10 mm., fructiferis 15 mm. longis, subangulatis, sparse pilosis, floribus numerosis; sepalis subaequalibus, 7 mm. longis, 1.2–2.4 mm. latis, lineari-lanceolatis, acutis vel obtusiusculis, parum pilosis, marginibus pallidioribus; petalis subaequalibus, 8–9.5 mm. longis, 5.5 mm. latis, obovatis, retusis, valde atrovenosis; staminibus 7, antheris basifixis, conicis cum poris apicalibus, ca. 6 mm. longis, staminodiis 3, spathulatis, 2–3 mm. longis, 1.2 mm. latis, basi attenuatis in filamentis tenuibus; ovario glabro; leguminibus compressis, glabris, immaturis, 4.5–5 cm. longis, 4–5 mm. latis, seminibus ignotis. Tab. I, fig. 11–15.

MEXICO: MEXICO: dist. Temascaltepec, Nanchititla, by the water, Aug. 31, 1934, *Hinton et al. 6530* (G, TYPE).

Cassia stenosepala, a member of the segregate genus *Earleocassia* Britton, is most closely related to *C. arida* Rose (*E. arida* (Rose) Britton) according to the key in the North American Flora (xxiii. 247 (1930)). The distinctive characters of the two species may be summarized in the following manner:

Inflorescence 1–several-flowered; stem and branches loosely villous; legume long-pubescent.....*C. arida.*
Inflorescence long-racemose, many-flowered; stem and branches pilose; legume glabrous.....*C. stenosepala.*

CASSIA **tortuosa,** spec. nov., arbor, 5 m. alta, ramulis tortuosis, sparse vel moderate pubescentibus, internodiis brevibus; foliis 2–8 cm. longis, petiolatis; petiolo 10–18 mm. longo; rhachi valde striata, magna pro parte glabra, striis pubescentibus, cum glandula unica clavata supra jugum infimum et saepe glandula apicali;

stipulis linearibus, pubescentibus, 6–7 mm. longis; petiolulis pilosis, 2 mm. longis; foliolis 6–8-jugis, ellipticis, 18–35 mm. longis, basi parum attenuatis, apice obtusis mucronatis, marginibus ciliatis, undique glabris nervo centrali excluso; bracteis mox deciduis; pedunculis axillaribus, bifloris; pedicellis 15–18 mm. longis, lineatis, sparse pilosis; floribus valde irregularibus; sepalis 5, duobus exterioribus ca. 4 mm. longis, 2.6 mm. latis, parum pubescentibus, marginibus ciliatis, tribus interioribus multo majoribus, obovatis, foris pilosis, intus basi parum pilosis, marginibus ciliatis; petalis aureis (fide *Hinton*), foris pubescentibus, duobus exterioribus maximis, brevi-unguiculatis, semiorbiculatis, 16 mm. longis, 8 mm. latis, tribus interioribus multo minoribus, parum obovatis, unguiculatis, ca. 7.5 mm. longis, ca. 3.5 mm. latis, unguicula ca. 3 mm. longis; antheris staminum 3 inferiorum incurvis, ca. 8 mm. longis, tenuiter rostratis, filamentis 3 mm. longis, pilosis, antheris 4 intermediorum ca. 6 mm. longis, rostro biporoso vix prominulo, filamentis brevibus, staminodiis 3, parvis, in laminam obovatam dilatatis; ovario piloso; legumine 3.5–11 cm. longo, 0.8 cm. lato, parum piloso, seminibus numerosis, latis planisque. Tab. I, fig. 16–18.

MEXICO: Mexico: dist. Temascaltepec, Nanchititla, on a barranca, June 11, 1934, *Hinton 6144* (G, TYPE).

Cassia tortuosa has affinities with the segregate genus *Peiranisia* Raf., but is not referable to any species of that group because of its extremely unequal petals (see Pl. I, fig. 18). The two outer petals, at maturity, are about twice as long and broad as the three inner petals. *C. Quiedondilla* M. Micheli has much larger flowers with a tendency toward unequal petals but does not approach our species very closely.

Brongniartia **proteranthera,** spec. nov., arbor, 3–4 m. alta; ramis glabris; foliis imparipinnatis, rhachi longe denseque strigosa, foliolis 7, ovato-acuminatis, juventute dense strigosis, maturitate ignotis; stipellis rudimentariis ad floccum pilorum rubrorum reductis; stipulis obovatis, subtus reticulatis et longe strigosis, supra breviore et sparse strigosis, apice obtusiusculis, basi attenuatis, 10–15 mm. longis, 6–10 mm. latis, in inflorescentia bracteis simulantibus; pedicellis axillaribus solitariis plus minusve denso-pilosis, floriferis 4 mm., fructiferis 8 mm. longis, apice articulatis; bracteolis vel subulatis et ca. 0.6 mm. longis, vel ad floccum capillorum reductis; floribus caeruleo-nigris (fide *Hinton*) calycis ca. 1 cm. longis, foris glabris, intus flocculosis, lobis lanceolatis, acuminatis,

tribus inferioribus ad medium liberis; corollis ca. 15 mm. longis, vexillo suborbiculato, leviter retuso, alis semiobovatis, unguiculatis, carinis semiobovatis, basi attenuatis, unguiculatis; ovariis glabris; leguminibus compressis, ellipticis, 4 cm. longis, 1.6 cm. latis, glabris. Tab. I, fig. 19–23.

MEXICO: GUERRERO: dist. Coyuca, on hill, Pungarabato, April 24, 1934, *Hinton et al. 5947* (G, TYPE); same locality, May 10, 1935, *Hinton et al. 7750* (G).

Brongniartia proteranthera is particularly notable because its flowers mature before its leaves. In this respect it is similar to *B. oligosperma* Baillon and *B. nudiflora* Watson. From the former species *B. proteranthera* differs in its arboreal habit, glabrous branches, fewer leaflets, smaller calyces and longer glabrous legumes. From the latter, our species differs chiefly in indument, which is yellow in *B. nudiflora*, and in its arboreal habit.

After considerable study the authors have concluded that the character of inflorescence-type which Rydberg [1] has made the basis for the primary division in his key, is largely a function of the maturity of the plant. That is, the flowers of *Brongniartia* species are always axillary but the floral leaves often mature late or remain abortive. There appear to be three characteristic types of flowering: 1) represented by *B. podalyrioides*, in which at least the upper floral leaves are abortive and each group of pedicels is subtended by stipules which resemble bracts; 2) represented by *B. proteranthera*, *B. nudiflora* and *B. oligosperma*, in which the flowers begin to mature somewhat before the leaves, and 3) represented by *B. Benthamiana* and the majority of the species, in which leaves are produced before flowering occurs or simultaneously with the developing flowers.

The inflorescence-type throughout the genus, then, is essentially the same and the degree and time of leaf development is the distinctive character.

BRONGNIARTIA **cuneata,** spec. nov., arbor 3 m. alta; ramis glabriusculis; foliis breviter petiolatis, imparipinnatis, 6–15 cm. longis, rhachi sparse strigosa; petiolis 6–11 mm. longis; foliolis (9)–17–23, cuneatis, breviter petiolulatis (petiolulis 1–3 mm. longis), apice cuspidatis, 15–26 mm. longis, 6–15 mm. latis, juventute tenuibus et sparse strigosis, maturitate coriaceis, glabris vel cum pilis paucissimis, valde reticulatis; stipulis mox deciduis, ignotis; pedicellis axillaribus, binis, 15–30 mm. longis, strigosis,

[1] Rydberg, P. A., N. Am. Fl. xxiv. 186–188 (1923).

apice articulatis, bracteolis ad annulum capillorum reductis; calycis ca. 1 cm. longis, foris strigosis, intus flocculosis, lobis lanceolatis, acuminatis, tribus inferioribus ad medium liberis, corollis 13–15 mm. longis, vexillo latissime ovato, emarginato, alis semiobovatis basi biauriculatis, carinis oblique obovatis, auriculatis; ovario glabro; leguminibus compressis, subellipticis, interne substantia spongiosa vestitis, 3–4.5 cm. longis, 1.5–2 cm. latis, mox dehiscentibus; seminibus 2–3, oblongo-ellipticis, ca. 10 mm. longis, 5 mm. latis, appendiculatis. Tab. II, fig. 1–6.

MEXICO: GUERRERO: dist. Coyuca, on hill, Alborejo, July 19, 1934, *Hinton 6311* (G, TYPE); from same tree, July 5, 1935, *Hinton 8019* (G); by the trail, Alborejo, Aug. 11, 1935, *Hinton 8727* (G).

B. cuneata seems to be allied to the *Foliosae* of Rydberg (see N. Am. Fl. vol. xxiv., pp. 186–197), and in this group is most closely related to *B. pauciflora* Rose. Our species differs from the latter in having narrowly cuneate leaflets and biauriculate wing-petals.

BRONGNIARTIA **funiculata,** spec. nov., fruticosa, 1–2 m. alta; ramis glabris; foliis imparipinnatis, 3–15 cm. longis, petiolatis; stipulis glabris vel ciliatis, reticulatis, semihastatis, 5–26 mm. longis, 3–12 mm. latis; petiolis 5–15 mm. longis, rhachi subangulata, glabriuscula vel sparse pilosa; foliolis 3–13, ellipticis, ovatis vel obovatis, mucronatis, prominenter reticulatis, undique glabris vel sparse longo-pilosis; petiolulis 1–1.5 mm. longis, rugosis; stipellis 0.8–1.0 mm. longis, subulatis; pedicellis 10–17 mm. longis, glabris, apice articulatis, plerumque 1–4 in axillis, foliis floralibus saepe ad stipulas geminatas reductis; bracteolis abortivis; calycis subcylindricis, 7–8 mm. longis, foris glabris, intus flocculosis, lobis lanceolatis, acuminatis, tribus inferioribus ad medium liberis, duobus superioribus connatis fere ad apicem; corollis ca. 1 cm. longis, vexillo suborbiculato, alis suboblongis, basi unguiculatis, carinis semiobovatis, unguiculatis; ovario glabro; leguminibus compressis, 20–25 mm. longis, ca. 15 mm. latis, rugulosis; seminibus oblongis, immaturis 3 mm. longis, ca. 1 mm. latis, funiculis ca. 2 mm. longis. Tab. II, fig. 7–11.

MEXICO: MEXICO: dist. Temascaltepec, Luvianos, oak woods, Dec. 25, 1933, *Hinton et al. 5397* (G, TYPE); Tejupilco, Sept. 3, 1932, *Hinton 1591* (G).

B. funiculata is related to *B. podalyrioides* HBK., from which it differs in size of calyx and corolla, and size and shape of legume:

Legume oblong, 4–9-seeded, stipe shorter than calyx.....*B. podalyrioides.*
Legume more than half as broad as long, 2–4-seeded, stipe slightly longer to twice as long as calyx.....*B. funiculata.*

Brongniartia funiculata appears to be intermediate between *B. podalyrioides* and *B. proteranthera* in regard to leaf-development. On the type specimen, *Hinton et al. 5397*, the legumes are in the axils of fully developed leaves; on the other hand, on *Hinton 1591*, the flowers are sometimes borne in the axils of developed leaves, but often the pedicels are subtended by the bract-like stipules only; and the position, terminal or lateral, of the flowers, seems to bear no relation to the degree of leaf development.

BEGONIA Section **Cylindrobegonia,** sect. nov., tepalis masculinis 4, staminibus numerosis, filamentis in columna cylindrica connatis, superne liberis, antheris subaequalibus, obovatis, retusis, bilocularibus, loculis obliquis. Tepalis femineis 5, subaequalibus, stylis 3, profunde bifidis, stigmatibus spiraliter cinctis. Ovario 3-loculato, elongato, placentis bipartitis, undique ovuliferis; capsulis elongatis, gracilibus, longo-pedicellatis, alis inconspicuis. Floribus paucis, axillaribus. Species unica. Affinis sectionibus *Barya* et *Podandra.*

BEGONIA (§CYLINDROBEGONIA) **cylindrata,** spec. nov., herbacea monoica; foliis petiolatis, anguste semicordatis, plus minusve 5-lobatis, denticulato-serratis, supra glabratis, subtus brevi-pilosis, pustulatis, 4–10 cm. longis, 1.3–3.2 cm. latis; stipulis lineari-lanceolatis, puberulis, ciliatis, ad 6 mm. longis, 2 mm. latis; petiolis lineatis, moderate pilosis, 2–6 cm. longis; bracteis parvis, ciliatis, 1–3.5 mm. longis; floribus paucis, axillaribus, plerumque binis; tepalis masculinis 4, duobus exterioribus obovatis vel suborbiculatis, 8 mm. longis, 6–8 mm. latis, apice leviter laceratis ciliatisque, duobus interioribus ellipticis, marginibus integris, ca. 6 mm. longis, ca. 3 mm. latis, staminibus numerosis, ut in sectionis descriptione; tepalis femineis 4 vel 5, subaequalibus, ellipticis vel obovatis, 4–8 mm. longis, 3.4–4 mm. latis, subintegris vel ciliato-denticulatis; ovariis stylisque ut in sectionis descriptione, pedicellis floriferis, 0.8–2 cm. longis, fructiferis 2–5 cm. longis, lineatis, moderate hirsutis; capsulis elongatis, 18–37 mm. longis, 3–7 mm. diametro (alis inclusis), sparse brevi-hirsutis cum pilis septatis; alis duabus minoribus angustioribus, tertio subapice expanso tum angusto ad pedicellum. Tab. II, fig. 12–15.

MEXICO: MEXICO: dist. Temascaltepec, Pantoja, Oct. 24, 1933, *Hinton 5042* (G, TYPE).

The character of the staminate flowers of *B. cylindrata* indicates an affinity to the sections *Podandra* and *Barya*. Our species is distinguished from these, however, by its very numerous short stamens and long filaments which are basally adherent to all sides of a stout column. In *Podandra* the stamens are fewer in number with longer anthers and much shorter filaments fused to a column, while in *Barya* the filaments are essentially equal in length to the anthers and attached to all sides of an elongated slender column. *B. cylindrata* differs from species in the section *Barya* also in the character of the tepals of the staminate flowers which are differentiated into two series and range in shape from elliptic to obovate but never approach the characteristic lanceolate outline distinctive in *Barya*. In the pistillate flower the styles distinguish our section and species from *Barya*. In *Cylindrobegonia* the three stout styles are deeply bifid and spirally encircled by a stigmatic band. In *Barya* the extremely elongate styles are five times encircled by the bands of stigmatic papillae. In its capsule, however, the section *Cylindrobegonia* is clearly distinct not only from *Podandra* and *Barya* but also from all other sections of the genus in the New World. The capsule is elongate with three inconspicuous wings, one of which is slightly enlarged below the apex and tapers gradually so that at the base its width is no greater than that of the other two. Clearly then, *Begonia cylindrata* represents a section of the genus until now unrecognized.

BEGONIA (§HUSZIA (Klotzsch) Irmscher) MONOPHYLLA Pavon in DC. Prod. xv. pt. i, 284 (1864). *B. unifolia* Rose in Trelease in Rept. Mo. Bot. Gard. xv. 80 (1904).

Begonia monophylla is represented in the Gray Herbarium by a photograph of the type specimen labeled in Pavon's hand "de NE" [from Nueva España, i.e. Mexico]. When Trelease published *B. unifolia* Rose he suggested the affinity of that species to *B. monophylla* but, being unable to compare them, he felt that the two could not be identical and also implied doubt as to the origin of Pavon's specimen. According to Lasègue [1] a great number of Mexican plants in the herbarium of Ruiz and Pavon seem to have been part of the collection of Mociño and Sessé, which seems most probable; since, according to Hemsley,[2] "Pavon himself was never in Mexico, and there is evidence of his having dealt freely in the sale of dried plants." Assuming, then, that Pavon's plant did come from Mexico as indicated by his own annotation, the authors com-

[1] Lasègue, A., Musée Botanique de M. Benjamin Delessert, p. 522 (1845).
[2] Hemsley, W. B., Biol. Centrali-Am. Bot. iv. 120 (1887).

pared the photograph carefully with material of *B. unifolia* Rose and found no reason for treating this species as a distinct entity. By the shape, margin and venation of leaves and bracts, the two cannot be differentiated; and the capsules, variable in detail on single specimens, conform in general, in the isotype of *B. unifolia* and the type of *B. monophylla*. The other diagnostic characters not easily determined from a photograph are, according to the descriptions, in every way comparable between the two.

It seems wise, therefore, to consider *B. unifolia* Rose in Trel. as a synonym of *B. monophylla* Pav.

Material examined in addition to the photograph of the type:

MEXICO: Morelos: Calcareous banks and ledges near Jojutla, 909 m., Aug. 30, 1902, *Pringle 8690* (G, isotype of *B. unifolia* Rose). Guerrero: in cañon de la Mano Negra, near Iguala, Aug. 11, 1905, *Rose, Painter & Rose 9367* (G); limestone ledges, mountains near Iguala, 1212 m., Oct. 3, 1900, *Pringle 9225* (G). Mexico: dist. Temascaltepec, cliffs, Bejucos, Aug. 19, 1933, *Hinton 4553* (G).

Begonia (§Huszia (Klotzsch) Irmscher) **extranea,** spec. nov., tuberosa, verisimiliter dioica, 3–5 dm. alta; caule fusco-pubescente, foliis palmati-7-nerviis, subreniformibus vel oblique cordatis cum lobo longissimo attenuato, 5–12-lobatis, serrulatis; petiolis 5–11 cm. longis, molle pubescentibus cum pilis multiseptatis ca. 0.2 mm. longis; foliis supra moderate tomentosis cum pilis adpressis eis petiolum similibus, in venis principiis longior, subtus etiam aliquid tomentosis cum pilis similibus sed longior (paene 1 mm. longo), marginibus ciliatis cum pilis gracilibus, longo-attenuatis, multi-septatis, atro-rufosis quum siccatis; stipulis late deltoideis, basi truncatis (6–9 mm. latis) apice laceratis vel valide fimbriatis, longo-ciliatis, 6–11 mm. longis, moderate hirsutis; inflorescentia cymosa; bracteis deltoideis vel paene oblongis vel longo-attenuatis, apicibus acutis vel fimbriatis cum marginibus ciliatis (1–3 mm. longis); bracteolis bracteis similibus sed minoribus; pedicellis dense hir-sutis; tepalis masculinis 4, duobus exterioribus 7.5–8.5 mm. longis, 5.5–6.5 mm. latis, ovatis, apice fimbriatulis vel serrulato-ciliatis, duobus interioribus 7–8 mm. longis, 4–5 mm. latis, ovato-acutis, serrulato-ciliatis; staminibus numerosis, filamentis liberis, antheris obovatis, siccis nigris; tepalis femineis 4 vel 5, fimbriatulis vel serrulato-ciliatis, ovato-acutis, ca. 4 mm. longis, 3–3.5 mm. latis, dorso dense pubescentibus, stylis 3, bipartitis; ovariis 4 mm. longis, 3.5 mm. latis, dense hirsutis; capsulis visis valde immaturis. Tab. II, fig. 16–18.

MEXICO: Mexico: dist. Temascaltepec, Volcan, 1460 m., July 8, 1932, *Hinton 993* (G, TYPE); Jalisco: shallow barranca, Hacienda San Marcos, alt. 1121 m., July 13, 1905, *Goldsmith 171* (staminate plant) (G).

Begonia extranea, a member of the Section *Huszia*, related as closely to *B. monophylla* Pav. in A. DC., perhaps, as to any other species of the section, is characterized by its densely hirsute ovary, the conspicuous red ciliation of the leaves and its apparent dioecism. The type specimen, *Hinton 993*, is, so far as the authors can determine, completely pistillate; whereas the plant, *Goldsmith 171*, from which part of the description was compiled, is purely staminate. The two specimens, in the same stage of maturity, seem perfectly comparable, and in morphological characters are virtually identical.

In the form of its tubers *B. extranea* resembles *B. ornithocarpa* Standley, but differs from this species in the type of its indument, the nature of inflorescence and the shape of its leaves.

Begonia (§Magnusia (Klotzsch) Irmscher, subsection Gireoudia (Klotzsch) Irmscher) **falcata,** spec. nov., planta ca. 3 dm. alta; rhizomate 5 mm. crasso, foliis peltatis, 7-nerviis, oblique ellipticis ovatisve, acuminatis, apice ca. 1 cm. longo, integris vel obscure denticulatis, supra glabriusculis, subtus in venis rufo-hirsutis, 5.5–9 cm. longis, 3–6 cm. latis; stipulis lanceolatis longo-attenuatis, ca. 7 mm. longis; petiolis 7–18 cm. longis, rufo-hirsutis, pilis 2 mm. longis, multo-septatis; inflorescentia cymosa monoica; bracteis deciduis, scapo fere 2 dm. longo, moderate hirsuto, petiolis similibus; tepalis masculinis 2, 10 mm. longis, 10–13 mm. latis, late suborbiculatis, basi cordatis, subcarnosis, obscure venosis; staminibus numerosis, antheris oblongis, filamentis brevibus, pedicellis ca. 17 mm. longis, moderate rufo-hirsutis; tepalis femineis 2, suborbiculatis, 9–11.5 mm. longis, 11–12 mm. latis, pedicellis 15–16 mm. longis; ovariis parvo-hirsutis; stylis 3, bipartitis; capsulis basi obtusiusculis; ala unica, falcata, 15–20 mm. longa, 5–6 mm. lata; pedicellis ca. 2 cm. longis, obscure hirsutis. Tab. II, fig. 19–21.

GUATEMALA: dept. Suchitepequez: Volcán Atitlán, south slope, 1696 m., Oct. 22, 1934, *A. F. Skutch 1485* (G, TYPE).

Begonia falcata is distinguished, in the subsection *Gireoudia*, by its single well-developed falcate wing which is 3–4 times as long as broad. From its closest relative, *B. conchaefolia* A. Dietr., *B. falcata* is distinguished by having its styles fused well above the

ovary, by having only one wing developed (rather than three) and by a general tendency toward greater size and less abundant indument.

BEGONIA (§MAGNUSIA (Klotzsch) Irmscher, subsection GIREOUDIA (Klotzsch) Irmscher) **tinctoria,** spec. nov., planta ca. 3 dm. alta, rhizomate 5 mm. crasso; foliis petiolatis, 5-nerviis, oblique transverso-ellipticis, acuminatis, marginibus serrato-ciliatis (ciliis longissimis 3 mm. longis), supra glabriusculis, subtus pustulatis, 5.5–8.5 cm. longis, 3–4 cm. latis; stipulis ovatis, ca. 1 cm. longis, 0.8 cm. latis, apicibus capillaribus, longo-attenuatis, 5 mm. longis; petiolis 4–14 cm. longis, longo-ciliatis, ciliis foliorum similibus; inflorescentia cymosa, monoica; bracteis deciduis, non visis; caule florescente 21 cm. longo, sparse piloso, floribus incarnatis; tepalis masculinis 2, 9–10 mm. longis, 8–10 mm. latis, obovatis, antheris oblongis, quam filamenta longioribus; tepalis femineis 2, 7–9 mm. longis, 5–8 mm. latis, obovatis; pedicellis 1–3.5 cm. longis; ovariis glabris, stylis 3, bipartitis; capsulis, ca. 14 mm. longis, 12 mm. latis (alis inclusis), basi obtusis, alis 3, subaequalibus. Tab. II, fig. 22–24.

GUATEMALA: dept. SUCHITEPEQUEZ: Finca Mocá, epiphytic on stump in coffee plantation, 1454 m., Oct. 29, 1934, *A. F. Skutch 1556* (G, TYPE).

Begonia tinctoria, another member of the subsection *Gireoudia,* is distinguished by the combination of characters which it possesses, rather than by any one distinctive feature. Its non-peltate leaves separate it immediately from several species in the subsection, whereas its entire leaves set it apart from other species such as *B. caroliniaefolia* Regel, which has digitate leaves, and *B. heracleifolia* Cham. & Schlecht., with deeply cleft leaves. Its green subcordate leaves separate *B. tinctoria* from *B. imperialis* Lem., which has brown-mottled cordate leaves, and its cymose inflorescence distinguishes it from *B. hydrocotylifolia,* which has a paniculate inflorescence.

BEGONIA (§BEGONIASTRUM A. DC.) **Hintoniana,** spec. nov., suffrutescens, caule lineata, hispidula vel glabra; foliis petiolatis, oblique subellipticis, cordatis, 5–6-nerviis, saepe multilobatis (11), saepe nullo modo, serratulo-ciliatis; petiolis 1–8 cm. longis, hispidis; foliis supra hispidulis vel punctatis, subtus similibus vel dense hispidis; stipulis bracteisque non visis; inflorescentia cymosa, monoica, bracteolis linearibus vel lineari-lanceolatis, fimbriatis, 3–4 mm. longis; pedicellis hirsutis vel glabris, 7–16 mm. longis; tepalis masculinis 4, duobus exterioribus duobus interioribus

similibus, 8–14 mm. longis, 5–6 mm. latis, subellipticis vel obovatis, apicibus acutis, grosse serratis, paginis dorsalibus femineis similibus, staminibus liberis; tepalis femineis 5, 6–11 mm. longis, 4–6 mm. latis, ovatis, acutis, grosse serratis, paginis dorsalibus plus minusve papillatis (saepe dense papillatis); stylis 3, stigmatibus dilatato-lunatis; capsulis cum ala unica plus minusve triangulata glabraque, capsulis ipsis dense papillatis. Tab. II, fig. 25–27.

MEXICO: MEXICO: dist. Temascaltepec, 1750 m., Oct. 10, 1932, *Hinton 2050* (G, TYPE); Ixtapan, 1000 m., Oct. 23, 1932, *Hinton 2284* (G).

Begonia Hintoniana seems to fall naturally in section *Begoniastrum* A. DC. between subsections *Eubegonia* Warb. and *Knesebeckia* (Klotzsch) Irmscher, according to the classification of Irmscher (in Natürl. Pflanzenfam. 2 Aufl. Bd. 21, p. 586 (1925)). The distinctive character of *Begonia Hintoniana* which makes its inclusion in either subsection difficult is the papillose character of the capsule and, often, of the perianth members. We have not found similar outgrowths on the capsules of any other species of *Begonia*.

BEGONIA (§BEGONIASTRUM A. DC., subsection KNESEBECKIA (Klotzsch) Irmscher), **asteroides,** spec. nov., herbacea, ±7 dm. alta, caule glabra, costata; foliis tenuibus, petiolatis, 7-nerviis, oblique suborbiculatis subellipticisve, profunde sinu clauso cordatis, lobatis (tum venis primariis tum secundariis in lobis terminant) serrato-ciliatisque; in axillis foliorum bulbilliferis; petiolis 4–11 cm. longis, costis hispidulis; foliis supra sparse minuteque squamosis, subtus similibus densiusque; stipulis magnis, aliquid pilosis, late lanceolatis, apice acutiusculis vel brevi-acuminatis, ca. 9 mm. longis, 4–5 mm. latis, prominenter nervatis, marginibus scariosis, sparse ciliatis; inflorescentia cymosa, monoica et etiam aliqui cum floribus masculinis solum; bracteis bracteolisque inconspicuis et mox deciduis; pedicellis tenuibus, 5–13 cm. longis, glabris; tepalis masculinis 4, uno exteriori ovato, obtuso, ca. 9 mm. longo, 6 mm. lato, uno secundo subelliptico, 10 mm. longo, 6 mm. lato, duobus interioribus obovatis, 7 mm. longis, 5 mm. latis, staminibus numerosis, maxima pro parte liberis; tepalis femineis 5, 3 mm. longis, 2.5 mm. latis, ovatis; capsulis glabris, immaturis 5 mm. longis, 3-alatis, alis 1.5 mm. latis. Tab. II, fig. 28–30.

MEXICO: MEXICO: dist. Temascaltepec: Tejupilco, 1340 m., Oct. 16, 1932, *Hinton 2206* (G, TYPE); Temascaltepec, rocky hill, 1900 m., Nov. 18, 1932, *Hinton 2428* (G).

Begonia asteroides, a member of the section *Begoniastrum* A. DC., subsection *Knesebeckia* (Klotzsch) Irmscher, possesses the characters typical of the subsection, as defined and illustrated by Klotzsch (Begoniaceen-Gattungen und Arten, Berlin, Abhandl. 1854, pp. 41, 42, t. II-C (1855)) and somewhat clarified by Irmscher (Natürl. Pflanzenfam. 2 Aufl. Bd. 21, p. 586 (1925)). Its aspect is made outstanding by the rather large axillary bulblets and the diffuse inflorescence, somewhat reminiscent of the woodland Asters.

Breweria **elliptica,** spec. nov., fruticosa; caule volubili, pilis albis dense induti; foliis petiolatis, ellipticis, 3–5.5 cm. longis, 2.5–4 cm. latis, mucronatis, basi minute obliquo, supra longe strigosis, subtus densius strigosis, venis prominulis; petiolis 8–9 mm. longis, dense strigosis; inflorescentiis axillaribus, cymosis, ad 11-floris; pedicellis 8–10 mm. longis, dense pilosis caulibus similibus; bracteis numerosis, pilosis, acuminatis, 3.5–7 mm. longis; sepalis aequalibus, ovato-acuminatis, longe strigosis, marginibus tenuioribus, ciliatis, 13–15 mm. longis, 5–6 mm. latis; corolla infundibuliformi, striis 5 longe fulvo-strigosis, 3.8–5.0 cm. longis; stylo bifido; stigmatibus capitatis; capsulis ignotis. Tab. II, fig. 31, 32.

MEXICO: Mexico: dist. Temascaltepec, 1230 m., Oct. 14, 1932, *Hinton 2176* (G, type).

Breweria elliptica differs from *B. sulphurea* Brandegee, its closest relative, in its very much larger flowers and its regularly much-branched cymose inflorescences, which are borne in the axils of leaves of the primary branches, rather than in the axils of leaves of secondary leafy branches.

Ipomoea **cordata,** spec. nov., planta herbacea; caule volubili, glabriusculo; foliis petiolatis, petiolis 0.5–5.0 cm. longis, glabriusculis cum paucis pilis longis in apice paginae ventralis; foliis cordatis, glabris, acuminatis, ciliatis, 4.5–9.0 cm. longis, 3.0–8.5 cm. latis; inflorescentiis axillaribus, cymosis simplicissimis, pedunculis 4–5.5 cm. longis, ramis cymorum tenuibus, rectis et valde divaricatis, 2–3.8 cm. longis, tum pedunculis tum ramis glabris; bracteis minutis, squamiformibus; pedicellis 3–10 mm. longis, ad apicem incrassatis; sepalis subaequalibus, 4–5 mm. longis, 2–3 mm. latis, glabris, marginibus tenuibus, mucronatis, interioribus aliquid maioribus; corollis ca. 2 cm. longis, rubro-purpureis siccatis; capsulis ovoideis, 12–14 mm. longis, 6–9 mm. diametro; ovario 2-loculato; seminibus 4, puberulentis. Tab. II, fig. 33, 34.

MEXICO: GUERRERO: dist. Coyuca, Cutzamala, Nov. 15, 1934, *Hinton 6984* (G, TYPE).

Ipomoea cordata is closely related to *I. Tuerckheimii* Donn. Sm., from which it differs in its very simple, cymose inflorescences, its stouter pedicels, its larger, broader leaves and longer petioles.

EXPLANATION OF PLATES.

PLATE I.

Fig. 11. CASSIA STENOSEPALA Smith & Schubert (*Hinton 6530*), leaf × ½.
Fig. 12. Same, flower × 1.
Fig. 13. Same, petal × 2.
Fig. 14. Same, stamens and pistil × 2.
Fig. 15. Same, fruit × 1.
Fig. 16. CASSIA TORTUOSA Smith & Schubert (*Hinton 6144*), leaf × ½.
Fig. 17. Same, fruiting branchlet × ½.
Fig. 18. Same, flower × 1.
Fig. 19. BRONGNIARTIA PROTERANTHERA Smith & Schubert (*Hinton 5947*), fruiting branchlet × ½.
Fig. 20. Same, calyx cut open × 1.
Fig. 21. Same, standard × 1.
Fig. 22. Same, wing × 1.
Fig. 23. Same, keel × 1.

PLATE II.

Fig. 1. BRONGNIARTIA CUNEATA Smith & Schubert (*Hinton 6311*), leaf × ½.
Fig. 2. Same, flower × ½.
Fig. 3. Same (*Hinton 8727*), fruit with one valve removed × ½.
Fig. 4. Same (*Hinton 6311*), standard × 1.
Fig. 5. Same, wing × 1.
Fig. 6. Same, keel × 1.
Fig. 7. BRONGNIARTIA FUNICULATA Smith & Schubert (*Hinton et al. 5397*), leaf and fruit × ½.
Fig. 8. Same (*Hinton 1591*), calyx cut open × 1.
Fig. 9. Same, standard × 1.
Fig. 10. Same, wing × 1.
Fig. 11. Same, keel × 1.
Fig. 12. BEGONIA CYLINDRATA Smith & Schubert (*Hinton 5042*), inflorescence × ⅕.
Fig. 13. Same, capsule × 1.
Fig. 14. Same, pistillate flower × 2.
Fig. 15. Same, staminate flower × 2.
Fig. 16. BEGONIA EXTRANEA Smith & Schubert (*Goldsmith 171*), staminate plant × ⅕.
Fig. 17. Same, staminate flower × 1.
Fig. 18. Same (*Hinton 993*), young pistillate flower × 1.
Fig. 19. BEGONIA FALCATA Smith & Schubert (*Skutch 1485*), plant × ⅕.
Fig. 20. Same, staminate flower × 1.
Fig. 21. Same, fruit × 1.
Fig. 22. BEGONIA TINCTORIA Smith & Schubert (*Skutch 1556*), plant × ⅕.
Fig. 23. Same, staminate flower × 1.
Fig. 24. Same, fruit × 1.
Fig. 25. BEGONIA HINTONIANA Smith & Schubert (*Hinton 2050*), plant × ⅕.

Fig. 26. Same, staminate flower × 1.
Fig. 27. Same, pistillate flower and young fruit × 1.
Fig. 28. BEGONIA ASTEROIDES Smith & Schubert (*Hinton 2206*), lower leaf with axillary bulblet × ⅕.
Fig. 29. Same, pistillate flower and young fruit × 1.
Fig. 30. Same, staminate flower × 1.
Fig. 31. BREWERIA ELLIPTICA Smith & Schubert (*Hinton 2176*), leaf and inflorescence × ⅕.
Fig. 32. Same, gynoecium × 1.
Fig. 33. IPOMOEA CORDATA Smith & Schubert (*Hinton 6984*), leaf and inflorescence × ⅕.
Fig. 34. Same, fruit × 1.

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4. STUDIES IN THE IRIDACEAE,—I.

By Robert C. Foster.

I. A Current Misinterpretation of Gladiolus Subgenus Hebea Pers.

An endeavor to identify some unnamed specimens of *Gladiolus* in the Gray Herbarium resulted in the discovery that there is a discrepancy between the usual interpretation of *Gladiolus* subg. *Hebea* and that of some South African botanists, e.g., Mrs. H. M. L. Bolus in S. Afr. Gard. xix. 123 (1929) and Miss G. J. Lewis in Pole Evans, Fl. Pl. S. Afr. xiv. pl. 549 (1934). The concept of the South African botanists is that of a group with short, rather rigid, membranous, brown spathes, a short perianth-tube, unguiculate perianth-segments, apiculate anthers, retuse stigmas, wingless or very narrowly winged seeds, and corms with tunics prolonged upwards into long fibrous collars. About a dozen species sharing these characteristics have been segregated by them from *Gladiolus* as the genus *Hebea* (Pers.) Hedw. f. That these species are distinct from *Gladiolus* is, I am certain, correct, but a consideration of the concept of *Hebea* from the time of its first use indicates that that name should not be applied to them. As opposed to the South African view, most workers have regarded *Hebea* as a subgenus of *Gladiolus* containing about fifteen species, characterized by rather large, green, herbaceous spathes, a relatively short perianth-tube, unguiculate perianth-segments, non-apiculate anthers, entire or sometimes retuse stigmas, broadly winged seeds, and corms like those of true *Gladiolus*.

The name *Hebea* was first used by Persoon, Syn. Pl. i. 44 (1805), for a subgenus of *Gladiolus* L., containing six species. It was

briefly characterized as follows: "Cor. tubo brevi, lacin. divaricatis, suprema lanceolata fornicata, laterales obovatae, 3 inferiores angustae, pendulae, subunguiculatae." In the following year, the group was given generic rank by Hedwig f., Gen. Pl. 24 (1806), who merely copied Persoon's diagnosis verbatim and mentioned no species whatever, so that he created a genus without species. Although Hedwig made no mention of Persoon, his verbatim transcription of the latter's characterization indicates that the generic name should be treated as a new combination, *Hebea* (Pers.) Hedw. f., and not attributed solely to Hedw. f. Fifteen years later, Ecklon, Top. Verz. 41 (1827), used the name with generic rank, without characterization, making new combinations on the basis of Persoon's species, and adding two more specific names, which are *nomina nuda*. Reichenbach, Consp. Veg. 60, no. 1191b (1828), returned the group to subgeneric rank under *Gladiolus*. Steudel, Nom. (ed. 2) i. 724 (1840), treated the group as a genus, without generic or specific characterizations, making one new combination.

Here the matter seems to have rested until Klatt, in Linnaea xxxii. 689ff. (1863), both by expanding Persoon's diagnosis and by the species he included in the group, gave form to the now generally accepted view of the subgenus. His concept of 1863 was held, almost without change, by the following writers: Baker in Journ. Linn. Soc. xvi. 177 (1877), Handbk. Irid. 199 (1892), in Fl. Cap. vi. 138 (1896), and in Fl. Trop. Afr. vii. 362 (1898); Klatt, Ergänz. 3 (1882); Bentham & Hooker, Gen. Pl. iii. 710 (1883); and Diels in Engler & Prantl, Nat. Pflanzenfam. (rev. ed.) xva. 494 (1930). By all these, the group was treated as a subgenus of *Gladiolus*.

Nevertheless, Baker, in 1877 (l. c., p. 178), recognized that neither *Eu-Gladiolus* nor *Hebea* could properly hold *G. montanus* L. f. and *G. arenarius* Baker, which he segregated as *Gladiolus* subg. *Schweiggera* E. Mey. ex Baker. These species had short tubes, unguiculate segments, apiculate anthers, short, brown, membranous, rigid spathes, and wingless seeds, although Baker's brief diagnosis did not mention all these points. A similar concept of this subgenus was held by Klatt, Ergänz. 12 (1882); Bentham & Hooker, Gen. Pl. iii. 710 (1883); Baker, Handbk. Irid. 199 (1892), and in Fl. Cap. vi. 138 (1896); and Diels in Engler & Prantl, Nat. Pflanzenfam. (rev. ed.) xva. 494 (1930). With the exception of Klatt, who transferred the group to *Antholyza* L., all regarded it as a subgenus of *Gladiolus*. It is immediately apparent that this sixty-year-old concept of subg. *Schweiggera* is identical with the current South African concept of *Hebea*.

A more detailed examination of Persoon's subgenus is necessary. In it he included six species: *G. formosus* Pers., *G. alatus* L., *G. galeatus* Jacq. (non Burm. f.), *G. tabularis* Pers., *G. orchidiflorus* Andr., and *G. bicolor* Thunb. The first of these, *G. formosus*, is a new and illegitimate name given to *G. striatus* Jacq., Ic. ii. t. 260 (1786–93), Collect. Suppl. 28 (1796). Although Baker (ll. cc.) retains this plant as a *Gladiolus*, Ker-Gawler, in Kön. & Sims, Ann. Bot. i. 228 (1805) and Irid. Gen. 117 (1827), moved it to *Tritonia* Ker, while Klatt, Ergänz. 12 (1882), transferred it to *Antholyza*. Miss Lewis, in Pole Evans, Fl. Pl. S. Afr. xviii. pl. 686, in textu (1938), suggests a close relationship to *Babiana spiralis* Baker, but does not make the transfer to *Babiana*. *G. galeatus* Jacq., Ic. ii. t. 258 (1786–93), Collect. iv. 167 (1790), is not a *Gladiolus*, but belongs in *Synnotia* Sweet, as does *G. bicolor* Thunb., Diss. Glad. 16, t. 2 (1784). *G. tabularis* is a new and illegitimate name given to *G. montanus*, a species ascribed by Persoon to Thunberg, but first described by Linnaeus fil., Suppl. 95 (1781). In other words, of the six species allotted by Persoon to *Gladiolus* subg. *Hebea*, three belong to other genera.

Of the three species remaining, one, *G. orchidiflorus* Andr., has been misinterpreted. The original figure and description, in Bot. Rep. iv. t. 241 (1802), show a plant which obviously belongs in *Hebea* in the conventional sense. Klatt, in Linnaea xxxii. 733 (1863), assuming that *G. orchidiflorus* of Persoon was different from *G. orchidiflorus* of Andrews, transferred Persoon's plant to *Antholyza*, as *A. orchidiflora*. Persoon's description of *G. orchidiflorus* was brief but definite, and affords no reason for thinking his plant different from that of Andrews. The specific reference by Persoon to "flor. secundis" is true of *G. orchidiflorus* Andr. and is not true of *A. orchidiflora*, which is described as "floribus dense spicatis distichis." *G. alatus* and *G. orchidiflorus*, with long, green spathes, relatively short tube, unguiculate segments, non-apiculate anthers, and broadly winged seeds, agree with the conventional concept of *Hebea*. The third, *G. montanus*, has been shown by N. E. Brown, in Journ. Linn. Soc. xlviii. 26 (1928), to be synonymous with *G. parviflorus* Jacq., Obs. iv. 2, t. 78 (1771). This species, with smaller flowers, short, brown, membranous spathes, apiculate anthers, and wingless seeds, was shifted by Baker, as has been mentioned, to *Gladiolus* subg. *Schweiggera*. It might even be argued technically that since *G. parviflorus* is not actually a *Gladiolus*, it should not be considered in forming a concept of *Gladiolus* subg. *Hebea*. However, it is clear that only one of the six species originally in-

cluded by Persoon agrees with the current South African view of *Hebea*. The matter can easily be settled by typifying subg. *Hebea*. Accordingly, I am selecting *G. orchidiflorus* Andr. as the standard-species of this subgenus. The choice is not an arbitrary one; it is consistent with the usual interpretation of this subgenus and with the fact that the two actual species of *Gladiolus* in Persoon's original treatment are in harmony with this interpretation.

Although the selection of *G. orchidiflorus* as the standard-species regularizes the position of *Hebea* as a subgenus of *Gladiolus*, it does not cope with the species which the South African botanists have correctly recognized as generically distinct from *Gladiolus*. Because of the existence of *Schweiggera* Mart., Nov. Gen. & Sp. iii. 166, t. 297 (1829), it is impossible to raise subg. *Schweiggera* E. Mey. ex Baker to generic rank under that name. It becomes necessary, then, to provide a new name and an adequate generic description.

Exohebea, gen. nov.

Cormus parvus, tunicis fibrosis, sursum prolongatis in collum dense fibrosum circum basim caulis; folia pauca, 1–pluri-nervata; caulis simplex vel ramosus; inflorescentia spica disticha, floribus proterandris; spathae valvae breves, membranaceae, brunneae, rigidulae; perianthii tubus brevis; perianthii segmenta unguiculata; stamina unilateralia, filamenta infra summum faucis inserta, antherae apiculatae; stigmata plus minusve retusa; semina exalata vel angustissime alata. Syn.: *Gladiolus* subgenus *Schweiggera* E. Mey. ex Baker in Journ. Linn. Soc. xvi. 178 (1877); *Hebea* sensu auctorum austro-africanorum.

Type-species: *Exohebea parviflora* (Jacq.) R. C. Foster.

This genus, which appears to be confined to the extreme southern portion of South Africa, shows some resemblance in flower-shape to *Gladiolus* subg. *Hebea*, while with regard to its spathes, seeds, and apiculate anthers it is clearly related to the monotypic genus *Tritoniopsis* L. Bol.

Specierum Conspectus

Exohebea **angusta** (L. Bol.), comb. nov. Basinym: *Hebea angusta* L. Bol. in Journ. Bot. lviii. 106 (1930).

E. **apiculata** (Bol. f.), comb. nov. Basinym: *Gladiolus apiculatus* Bol. f. in Ann. Bolus Herb. ii. 106 (1917). Syn.: *Hebea apiculata* (Bol. f.) L. Bol. in S. Afr. Gard. xix. 123 (1929). Because

of its large size, this species is anomalous in the genus. According to the original description, the perianth-tube varies from 2.4 to 6.3 cm. in length, and the inner spathe (which is longer than the outer) from 3 to 4.3 cm. But in all its essential characters it appears, *ex descr.*, to belong to this group. It is possible that it is a tetraploid, or even an amphidiploid hybrid, which would account for its large size.

E. **caledonensis,** spec. nov. Cormus pro parte ignotus, sed collum fibrosum plus minusve 5 cm. longum; caulis simplex, super collum curvatus, 58 cm. longus, 1–2 bracteis brunneis, angustis, reductis, 2.5 cm. longis, ornatus; folia basalia 2, linearia, longe acuminata, 1-nervata, 22–25 cm. longa super collum, 2 mm. lata; inflorescentia spica disticha, 10–11-fl., floribus inferne 1–1.5 cm. inter se distantibus, spica 7–7.5 cm. longa; spathae valvae aequilongae, exterior 7.5 mm. longa, 3 mm. lata, integra, oblongo-ovata, margin-ibus pallidioribus, interior 4 mm. lata, integra, quam exterior obtusior, venis 2 subprominentibus, valvae utraeque superne brunneae, inferne pallidiores; ovarium ovoideum, 2 mm. longum; perianthii tubus 2 mm. longus; perianthii segmenta lutea clara, subaequalia, 9 mm. longa, lamina 3 mm. lata, spathulata, apice emarginata, unguis 3 mm. longus, 1.5 mm. latus, segmentum supremum subgaleatum (?), ejus lamina parum latior; filamenta 3 mm. longa, antherae 4.5 mm. longae, apiculo 1 mm. longo; stylus 7 mm. longus, stigmatibus brevissimis vix bilobatis, quam perianthii segmenta subduplo brevior; capsula seminaque non visa. Union of South Africa: Cape Prov.: Caledon Div.: near Caledon, Nov. 8, 1936, *Adolf Hafström & Gösta Lindeberg* (type, in Gray Herb.).

This species, named for the district from which it comes, is closely related to *E. fraterna* and *E. angusta.* From the former it differs in having fewer leaves, with 1 nerve instead of 2–3, a more lax, fewer-flowered spike, with the flowers smaller, the segments more nearly equal in size, and more completely enveloped by the spathes. From *E. angusta* it differs in having fewer and longer leaves, longer spathes, shorter and broader perianth-segments, shorter perianth-tube, anthers shorter than the uppermost segment, and the style little more than half as long as the segments.

E. **Dodii** (Lewis), comb. nov. Basinym: *Hebea Dodii* Lewis in Pole Evans, Fl. Pl. S. Afr. xiv. pl. 549 (1934).

E. **elongata** (L. Bol.), comb. nov. Basinym: *Hebea elongata* L. Bol. in Journ. Bot. lviii. 106 (1930).

E. **fraterna** (N. E. Br.), comb. nov. Basinym: *Gladiolus frater-*

nus N. E. Br. in Journ. Linn. Soc. xlviii. 26 (1928). See *E. parviflora* for comment.

E. **lata** (L. Bol.), comb. nov. Basinym: *Hebea lata* L. Bol. in Journ. Bot. lviii. 106 (1930).

E. LATA var. **longibracteata** (L. Bol.), comb. nov. Basinym: *Hebea lata* var. *longibracteata* L. Bol. in Journ. Bot. lviii. 107 (1930). To the synonymy of this species and its variety, I suspect that two more names should be added. In 1937, Grey, Hardy Bulbs i. 163–164, mentioned and briefly described a *Hebea alata*, which he ascribed to (L.) L. Bol., based on *Gladiolus alatus* L., and *H. alata* var. *longibracteata* L. Bol. I have been unable to find that Mrs. Bolus made such a new combination, and the only variety *longibracteata* which I have found in *Hebea* is that described by Mrs. Bolus under *H. lata*. Probably there has been a confusion, based on the similarity of name, between *G. alatus* and *Hebea lata*.

E. **nemorosa** (Klatt), comb. nov. Basinym: *Antholyza nemorosa* Klatt, Ergänz. 12 (1882). Syn.: *Schweiggera nemorosa* E. Mey. in Flora ii. Besond. Beigab. 109 (1843), *nomen nudum*; *Gladiolus nemorosus* (Klatt) Baker, Handbk. Irid. 226 (1892); *Gladiolus nemorosus* (Klatt) N. E. Br. in Journ. Linn. Soc. xlviii. 27 (1928).

E. **parviflora** (Jacq.), comb. nov. Basinym: *Gladiolus parviflorus* Jacq., Obs. iv. 2, t. 78 (1771). Syn.: *Hebea parviflora* (Jacq.) L. Bol. in S. Afr. Gard. xix. 123 (1929); *Gladiolus montanus* L. f., Suppl. 95 (1781); *Antholyza montana* (L. f.) Ker-Gawl. in Kön. & Sims, Ann. Bot. i. 233 (1805); *Gladiolus tabularis* Pers., Syn. i. 44 (1805); *Hebea orchidiflora* (Andr.) Eckl., Top. Verz. 43 (1827), as to plant; *Antholyza orchidiflora* (Andr.) Klatt in Linnaea xxxii. 733 (1863), as to plant; *Gladiolus arenarius* Baker in Journ. Linn. Soc. xvi. 178 (1877); *Hebea arenaria* (Baker) L. Bol. in S. Afr. Gard. xix. 123 (1929); *Antholyza fragrans* E. Mey. ex Klatt, Ergänz. 13 (1882).

In S. Afr. Gard. xix. 123 (1929), Mrs. Bolus retains *Hebea parviflora* and *Hebea arenaria* as distinct species. The latter is based on *Gladiolus arenarius* Baker, a new name given when he transferred *Antholyza orchidiflora* to *Gladiolus*. A new name was necessary for two reasons: (1) *G. orchidiflorus* Andr. barred the use of the trivial name of Klatt's plant; (2) Klatt's plant was based nomenclaturally on Andrews' name, but taxonomically on a misidentification, as is shown by his description and at least one of the collections cited, *Ecklon & Zeyher*, from the Olifantrivier, in Clanwilliam Division. A specimen of this collection in the Gray Herbarium agrees with Klatt's description, and both description

and plant are completely unlike Andrews' plate of *G. orchidiflorus*. Both the description and specimen agree, too, with Jacquin's description and figure of *G. parviflorus*, so that I have no hesitation in following N. E. Brown, in Journ. Linn. Soc. xlviii. 26 (1928), and regarding *A. orchidiflora* and *G. parviflorus* as identical. But, if the former is accepted as a synonym of the latter (or, rather, of *E. parviflora*), then *G. arenarius* automatically becomes a synonym of that species.

When Brown pointed out this identity, he noted that Baker in his descriptions of *G. arenarius*, Handbk. Irid. 226 (1892) and in Fl. Cap. vi. 163 (1896), as well as in the specimens cited therein, had confused two different species under this name. Part of the specimens were *G. parviflorus*, and the rest Brown described as *Gladiolus fraternus* N. E. Br., a name which Mrs. Bolus incorrectly places (l. c.) as a synonym of *Hebea arenaria* (Baker) L. Bol. Brown named as the type *Burchell*, no. 640, of which there is an isotype in the Gray Herbarium. This shows the leaves relatively broad for this group (to 5 mm.), with 2–3 prominent nerves, the perianth-tube shorter than the spathes, and the shape, color, and measurements of the perianth-segments like the details given by Brown. Jacquin's plate, however, shows 1-nerved leaves, the perianth-tube equal to or longer than the spathes, and perianth-segments notched at the apex, as compared with bluntly rounded segments in Brown's species. Klatt's description of *A. orchidiflora* agrees with Jacquin's plate, except for his statement that the tube is much shorter than the spathes. This, incidentally, is not true of the Gray Herbarium specimen of the *Ecklon & Zeyher* collection cited by Klatt. The discrepancy may be due to a mixture of species in the material cited by him. In view of these facts, there seems to me to be no difficulty in making *A. orchidiflora* and, therefore, *G. arenarius* synonyms of *E. parviflora*, and in maintaining Brown's species as distinct, ***E. fraterna***.

E. **ramosa** (Klatt), comb. nov. Basinym: *Antholyza ramosa* Klatt in Linnaea xxxii. 734 (1863). Syn.: *Hebea ramosa* Eckl., Top. Verz. 43 (1827), *nomen nudum*; *Gladiolus montanus* var. *ramosus* (Klatt) Baker in Journ. Linn. Soc. xvi. 178 (1877); *Gladiolus ramosus* (Klatt) N. E. Br. in Journ. Linn. Soc. xlviii. 27 (1928).

E. **unguiculata** (Baker), comb. nov. Basinym: *Tritonia unguiculata* Baker, Handbk. Irid. 196 (1892). Syn.: *Gladiolus unguiculatus* (Baker) N. E. Br. in Journ. Linn. Soc. xlviii. 27 (1928), non Baker in Journ. Linn. Soc. xvi. 178 (1877); *Hebea unguiculata* (Baker) L. Bol. in S. Afr. Gard. xix. 123 (1929).

II. A New Genus from South Africa.

Chasmatocallis, gen. nov. Cormus ignotus; folia basalia pauca, caulem breviter vaginantia; caulis ramosus; inflorescentiae spicae distichae, compactae, floribus paucis; spathae valvae breves, subaequales, exterior herbacea, interior hyalina; ovarium valde trigonale, apice depressum, superne papillatum, papillis simplicibus, pellucidis; perianthii tubus gradatim e basi ampliatus, medio parte longitudinis rectus, in fauce curvatus et fere ampliatus; perianthium bilabiatum, segmenta unguiculata, segmentum supremum labium unum formante, quam alia segmenta majus, aliquid galeatum, lateralia superiora sursum ad segmentum supremum curvata, tria segmenta inferiora cum callis erectis, recurvis, subpapillosis, in unguem prope laminae originem ornata; stamina unilateralia, infra summum faucis inserta, quam perianthii segmenta breviora, antherae apiculatae; stylus et stigmata antheras excedentia, sed quam segmentum supremum breviora, stigmata valde bifida; capsula trigonalis, apice depressa, aliquid papillata; semina in loculo pauca, rotundata vel subpyriformia, subrugosa, exalata. (From the Greek, *chasma,* a gap, and *callis*, beauty.)

The genus at present appears to be monotypic, with its single species occurring in Clanwilliam Division of Cape Province, Union of South Africa. In habit of growth, it seems to resemble some species of *Lapeyrousia,* such as *L. Fabricii* (Delar.) Ker and its relatives, a resemblance strengthened by the deeply bifid stigmas. In shape, the spathes resemble those of *Exohebea*, probably the closest relative of the new genus, but the outer spathe is herbaceous, not brown and membranous. The resemblance is further carried out in the shape of the perianth, the unilateral stamens, and the apiculate anthers, but the capsule and seeds, the calli, and, in particular, the bifid stigmas are different from that genus.

C. **Macowani** spec. nov. Cormus ignotus; folia basalia 2, ad 5 cm. super basim caulis vaginantia, lineari-falcata, ad 18 cm. longa, 3 mm. lata, nervi 3–5 subprominentes; caulis ramosus paullo super basim, rami bracteis foliosis 7–2 cm. longis subtenti, axis primarius (inflorescentia inclusa) ad 16 cm. longus; inflorescentiae 4–7-fl., rami, primario excepto, bractea breve, submembranacea, pallide rubro-marginata, ornati; spathae valva exterior superne pallide rubro-marginata, integra, oblongo-ovata, carinata, acuminata, ad 9 mm. longa, interior apice bifida, bicarinata, carinae coloratae; ovarium 2.5 mm. longum; perianthii tubus 8 mm. longus; perianthii segmentum supremum 1.6 cm. longum, lamina

obovata, acuta, circa 6 mm. lata, 5 inferiora labium inferius formantia, 1.9 cm. longum, 2 lateralia superiora prope basim emergentia, pars libera 1.3 cm. longa, lamina obovato-oblanceolata, acuta, 4 mm. lata, 3 infima subaequalia, 1.5 cm. longa, laminis obovatis, acutis, 4 mm. latis, segmentum quidque cum callo; filamenta in fauce 2 mm. infra summum inserta, 7 mm. longa, antherae 3.5 mm. longae; stylus 1.7 cm. longus, stigmata 2 mm. longa, antheras excedentia, quam segmentum supremum 5 mm. breviora; capsula 4 mm. longa; semina atrobrunnea. UNION OF SOUTH AFRICA: Cape Prov.: Clanwilliam Div.: Pakhuis Mt., near Clanwilliam, alt. ca. 2000 ft., Oct. 1897, *MacOwan in Herb. Austr.-Afr.*, no. 1975 (type, in Gray Herb.).

The type sheet contains two cormless plants, with the right-hand specimen definitely larger than the other. The description and measurements are based largely on this specimen. Loss of color in drying makes it impossible to state accurately the color of the flower in the living plant. The flowers may have been yellowish or pinkish; at present they show pink tips to the buds, with a small amount of pink or red near the top of the throat.

III. THE NOMENCLATURE OF SYMPHYOSTEMON MIERS.

THE genus *Symphyostemon*, a small group of South American *Iridaceae* segregated from *Sisyrinchium* L., is attributed almost without exception to Miers in Proc. Linn. Soc. i. 123 (1841) and in Trans. Linn. Soc. xix. 97 (1842). The first reference merely summarizes a paper read by Miers on Dec. 21, 1841, and is printed in no. XIV of the thirty-seven signatures comprising the first volume of the Proceedings. Since no. XIV reports part of the session of Dec. 21, 1841, and extends through a small portion of the report for March 15, 1842, it could not have been printed much before the middle of 1842. In the copy of this volume in the library of the Arnold Arboretum, many of the individual signatures are marked with the stamp of the owner, James Charles Dale, Esq., Sheriff, the stamp giving the year at the base. Some signatures have been cut in binding, in such a way that the date is lost, but the stamp on no. XII is dated 1843, as is that on no. XVI, which begins with the session of June 21, 1842, and ends with the beginning of the session of Dec. 20, 1842. Probably, then, no. XIV was published around the middle of 1842, certainly not later than 1843. The complete paper was published in Part 2 of volume xix of the Transactions, the title-page bearing the date 1843, not 1842 as most references cite it.

Actually, the name *Symphyostemon* was a provisional generic name, mentioned in a discussion of *Sisyrinchium* under Miers' new genus *Solenomelus* (ll. cc.), a genus based on (Proc., p. 122) "*S.* [*Sisyrinchium*] *odoratissimum* Cav. (which is apparently the same as *S. narcissoides* Lindl.) . . . [p. 123]. On these species Mr. Miers proposes to found a genus under the name of *Symphyostemon.*" In Trans. Linn. Soc. xix. 97 (1843), Miers wrote as follows: "it may probably be admitted as a separate genus under the name of *Symphyostemon*, in which case it would occupy a place between *Tigridia* and *Ferraria.*" Here, too, reference is made to "*S. odoratissimum* Cav." and "*S. narcissoides* Lindl. (Bot. Reg. vol. xv. No. 1283)." Unfortunately, the authorities and reference are reversed, *Sisyrinchium odoratissimum* Lindl. in Bot. Reg. xv. t. 1283 (1829) and *S. narcissoides* Cav., Diss. ii. 347 (1788) being correct. Since the Amsterdam Congress in 1935 rejected provisional names, as provided in Prop. Brit. Bot. 16, Art. 44 (1929), *Symphyostemon* Miers as published in 1842–43 must be rejected as invalid. The earliest validation that I can find is that of Klatt in Linnaea xxxi. 569 (1861–62), where it is properly named and described.

Before Klatt validated the name *Symphyostemon*, however, Herbert, in Bot. Reg. xxix. Misc. 85 (1843), described the genus *Psithyrisma*, basing it on *Sisyr. narcissoides* Cav., of which he made *Sisyr. odoratissimum* Lindl. a synonym. Consequently, if there were no earlier name available, *Psithyrisma* Herb. would naturally supersede *Symphyostemon* Miers ex Klatt. An earlier name is available, however, so that neither of these generic names can be used.

The genus *Phaiophleps* was described, not altogether adequately, by Rafinesque in the fourth part of his Flora Telluriana, p. 29. On the original cover of this rare work, the date of publication is given as 1836, but Barnhart has shown, in Torreya vii. 180, 182 (1907), that this portion was probably not published until about the middle of 1838. No mention of this name seems to be made by Bentham and Hooker, Genera Plantarum iii. (1883), Pax in Engler and Prantl, Nat. Pflanzenfam. (ed. 1) ii. (5). (1887–88), or Baker, Handbk. Irid. (1892). The earliest secondary reference known to me is in Index Kewensis iii. 485 (1894), where it is treated as a synonym of *Solenomelus* Miers, a disposition followed by Dalla Torre and Harms, Gen. Siphonogam. 82 (1900), and by Diels in Engler and Prantl, Nat. Pflanzenfam. (rev. ed.) xva. 483 (1930).

To dispose of *Phaiophleps* in this manner is incorrect. The genus was validly published, although not too completely de-

scribed, and based on a single species, *Sisyr. odoratissimum* Lindl. The transfer of the species to *Phaiophleps* was validated by author citation as well as by citing the place of publication. Since the only species Miers attributed to *Symphyostemon* was *Sisyr. odoratissimum* (*S. flexuosum* Lindl. was added in a footnote, Trans. Linn. Soc. xix. 97), which is also the type-species of *Phaiophleps*, it is clear that the provisionally-named *Symphyostemon* must be regarded as a synonym of *Phaiophleps*. In view of the fact that there are thus two validly-published names antedating Klatt's validification of *Symphyostemon*, it seems inadvisable to propose it for conservation, especially since the number of species involved is small.

As a revision of the group of genera including *Phaiophleps* is in process, a taxonomic treatment will not be given here. This revision cannot be completed for some time, so that a partial synonymy will be given and the necessary new combinations made. Preliminary study suggests that some of the species listed will probably reduced to varietal status or to synonymy.

PHAIOPHLEPS Raf., Fl. Tellur. iv. 29 (1838). *Symphyostemon* Miers in Proc. Linn. Soc. i. 123 (1842 ?) and in Trans. Linn. Soc. xix. 97 (1843), *nomen provisorium*; Miers ex Klatt in Linnaea xxxi. 569 (1861–62). *Psithyrisma* Herb. in Bot. Reg. xxix. Misc. 85 (1843). *Susarium* Phil. in Linnaea xxxiii. 249 (1864–65), in part.

P. **biflora** (Thunb.), comb. nov. *Gladiolus biflorus* Thunb., Diss. Glad. 10 (1784); *Solenomelus biflorus* (Thunb.) Baker in Journ. Linn. Soc. xvi. 121 (1877); *Symphyostemon biflorus* (Thunb.) Dusén in Svensk. Exped. Magell. iii (5). 203 (1900). *Sisyrinchium narcissoides* Cav., Diss. ii. 347, t. 191, f. 3 (1788); *Galaxia narcissoides* (Cav.) Willd., Sp. Pl. iii. 583 (1801); *Psithyrisma narcissoides* (Cav.) Herb. in Bot. Reg. xxix. Misc. 85 (1843); *Symphyostemon narcissoides* (Cav.) Miers ex Klatt in Linnaea xxxi. 569 (1881–62). *Sisyrinchium odoratissimum* Lindl. in Bot. Reg. xv. t. 1283 (1829); *Phaiophleps odoratissima* (Lindl.) Raf., Fl. Tellur. iv. 29 (1838), type of the genus.

P. **acaulis** (Klatt), comb. nov. *Sisyrinchium acaule* Klatt in Linnaea xxxiv. 736 (1865–66); *Solenomelus acaulis* (Klatt) Baker in Journ. Linn. Soc. xvi. 121 (1877); *Symphyostemon acaule* (Klatt) Benth. ex Baker, Handbk. Irid. 138 (1892).

P. **alba** (Kränzl.), comb. nov. *Symphyostemon album* Kränzlin in Engler, Bot. Jahrb. xl. 242 (1908).

P. **Lainezi** (Hicken), comb. nov. *Symphyostemon Lainezi* Hicken in Anal. Soc. Cientif. Argent. lxvi. 301 (1908).

P. **Lyckholmi** (Dusén), comb. nov. *Symphyostemon Lyckholmi* Dusén in Svensk. Exped. Magell. iii. (5). 201, t. 10 (1900).

P. **nigricans** (Phil.), comb. nov. *Susarium nigricans* Phil. in Linnaea xxxiii. 249 (1864–65); *Solenomelus nigricans* (Phil.) Baker in Journ. Linn. Soc. xvi. 121 (1877); *Symphyostemon nigricans* (Phil.) Benth. ex Baker, Handbk. Irid. 138 (1892).

P. **patagonica** (Speg.), comb. nov. *Symphyostemon patagonica* Spegazzini in Revist. Agron. La Plata iii. 574 (1897).

IV. Miscellaneous New Species and New Combinations.

Among the unidentified *Iridaceae* in the Gray Herbarium, several specimens appear sufficiently distinct to be described as new species. One of these is South American, while the rest are African. In addition, some new combinations are made, as well as a few corrections to an earlier paper.

Libertia **colombiana,** spec. nov. Rhizoma gracile, 3–4 mm. diam., basibus foliorum vetustorum dense vestita; folia basalia numerosa, flabellata, lineari-lanceolata, rigida, erecta, ad 20 cm. longa, 4 mm. lata, glabra, subglauca, acuta, nervo primario incrassato nervisque aliis subprominentibus, marginibus minute irregulariterque serrulatis, folia caulina pauca (1–3), plerumque ramos caulis subtentia; caulis simplex vel ramosus, ad 35 cm. longus, teres, glaber; inflorescentia ramosa, pauciflora; spatharum valvae 2–3-fl., exterior ad 1 cm. longa, subnaviculata, herbacea, striata, acuta, carinata, carina subfimbriata, interior ad 8 mm. longa; pedicellus ad anthesin 5 mm. longus, postea ad 2 cm. elongatus; ovarium glabrum, rotundato-turbinatum, ad 2 mm. longum, spathis fere inclusum; perianthii tubus subnullus; perianthii segmenta exteriora 3 mm. longa, 1.5 mm. lata, late ovato-lanceolata, subcarinata (?), viridi-membranacea, marginibus tenuioribus pallidioribusque, concava, apice obtusus cum fasciculo pilorum crassorum, segmenta interiora alba, 5 mm. longa, obovato-spathulata, breve unguiculata, lamina 3 mm. lata, apice rotundata; filamenta basi connata in tubum 0.75 mm. longum, libera 1.5 mm., glabra, antherae basi sagittatae, 1.25 mm. longae; stylus 1 mm. longus, glaber, stigmata 2 mm. longa; capsula subglobosa, trisulcata, apice depressa, 6 mm. longa; semina numerosa, atrobrunnea, rotundato-pyriformia. Colombia: Department of Caldas: Rio San Rafael, below Cerro Tatama, 2600–2800 met. alt., open rocky stream-bank, Sept. 7–11, 1922, *F. W. Pennell,* no. 10357 (type, in Gray Herb.); Cerro Tatama, 3200–3400 met. alt., open gulch in forest, Sept. 8–10, 1922, *F. W. Pennell,* no. 10474.

The genus *Libertia* Spreng. has a wide distribution in the Pacific area, being found in Australia, New Zealand, New Guinea, and on the west coast of South America, where all the species so far known occur in Chile. Consequently, this new species is of interest in that it greatly extends the range of the genus on that continent. The plant differs from *L. elegans* Poepp. in having fewer and smaller flowers, with the spathes more herbaceous, and the leaves in a more densely compact fan. In general, it is smaller and fewer-flowered than all the other South American species except *L. tricocca* Phil. Its leaf arrangement and flower size and number differ from that species.

Lapeyrousia **otaviensis,** spec. nov. Cormus basi complanatus, subglobosus, 4 cm. latus, 3 cm. altus, tunicae brunneae, crasse reticulato-fibrosae, fibrae sursum in collum setarum circum basim caulis 1.5 cm. prolongatae; folia producta 4, infimum pallide brunneum, hyalinum, 8.5 cm. longum, vaginante, alia caulem circa 18 cm. vaginantia, linearia, longe acuta, glabra, marginibus incrassatis, nervus primarius valde prominens, nervi 4–5 alii subprominentes, ad 60 cm. longa, 6 mm. lata, summum inflorescentia aequale vel parum brevius, folia caulina 2, pars libera ad 37.5 cm. longa, 6 mm. lata; caulis inferne subteres, 4-angulatus conveniens, anguli alati, 65 cm. altus, 33 cm. super basim copiose ramosus, rami inferiores majores bracteis foliosis, linearibus, acutis, ad 20 cm. longis et 6 mm. latis subtenti, cum bracteis minoribus in axillis inter ramos et axem primarium, herbaceis, superne axe submembraneis et gradatim decrescentibus, ramulis minimis bracteae minores absentes; inflorescentia panicula erecta, diffusa, spicata, ramuli 2–3-fl., aliquando 4-fl.; spatharum valvae subaequales, ad 1.1 cm. longae, integrae, oblongo-ovatae, acutae, carinatae, basi herbaceae, reliquum membranaceae, purpureo-suffusae; ovarium 2 mm. longum, oblongo-ovoideum; perianthii tubus ad 4.5 cm. longus, filiformis, infra perianthii segmenta paullo ampliatus; perianthii segmenta lineari-elliptica, subapiculata, ad 1.8 cm. longa, 3 mm. lata, pallide luteo-alba, basi purpureo-maculata; stylus filiformis, 6 cm. longus, stigmata 1.5 mm. longa, paulum bifida, antheras excedentia sed 4 mm. breviora quam perianthii segmenta; antherae sagittatae, lineares, 6 mm. longae, filamenta 7 mm. longa, plana, in tubum 2.5 mm. infra summum inserta; capsula seminaque non visa. Southwest Africa: Hereroland: Auros Farm near Otavi, Feb. 11, 1925, *Dinter*, no. 5577 (type, in Gray Herb.).

This large and rather striking species is not unlike *L. avas-*

montana Dinter, but differs in its corm tunics, in being taller (about 25 cm.), with the more numerous basal leaves shorter than the inflorescence, which is rather more branched in this species, longer spathes and anthers, different flower-color, and a very much longer perianth-tube.

LAPEYROUSIA FASCICULATA Ker-Gawl. This name first appeared in 1802, when Ker-Gawler, in Bot. Mag. xvi. sub t. 595, cited it as the equivalent of *Galaxia plicata* Jacq., Ic. ii. t. 292, Collect., Suppl. 30 (1796), a plant which Ker regarded as a *Lapeyrousia*. Nevertheless, the transfer was incomplete, and *L. fasciculata* as used in 1802 can be regarded only as a synonym of *G. plicata*. In 1805, the plant was validly transferred to *Lapeyrousia* as *L. fasciculata* Ker-Gawl. in König and Sims, Ann. Bot. i. 238, with *Galaxia plicata* and *Ixia heterophylla* Willd., Sp. Pl. i. 159 (1798), as synonyms. Since there was no bar to the use of either *plicata* or *heterophylla* as a trivial name in *Lapeyrousia*, the name *fasciculata* was illegitimate. Diels, in Engler and Prantl, Nat. Pflanzenfam. (rev. ed.) xva. 488 (1930), uses the name *L. plicata* (Jacq.) Diels, probably based on *Galaxia plicata*, but since neither basinym nor place of publication is cited, the combination must be regarded as incomplete. Shortly after this, Index Kewensis Suppl. viii. 132 (1932), attributed the combination to Diels, incorrectly, and validated it by citing a basinym. Unfortunately, the name-bringing synonym chosen was not *Galaxia plicata* Jacq., but *Gladiolus plicatus* L. sensu Jacq., which happens to be a *Babiana* as well as a misidentification. Because of this choice of basinym, *L. plicata* (Jacq.) of Ind. Kew. Suppl. viii. 132 cannot be applied to *Galaxia plicata*, but, nevertheless, remains as an earlier homonym to bar the valid transfer of *G. plicata* under its own specific name to *Lapeyrousia*.

When Willdenow published *Ixia heterophylla*, he cited *Galaxia plicata* Jacq. as a synonym. In this case, however, the change in name was legitimate, for Linnaeus had published an *Ixia plicata* in Cent. Pl. ii. 4 (1756). Willdenow's name, then, can be used as the basis for a transfer to *Lapeyrousia*, so that the plant becomes

LAPEYROUSIA **heterophylla** (Willd.), comb. nov. *Ixia heterophylla* Willd., Sp. Pl. i. 159 (1798); *Galaxia plicata* Jacq., Ic. ii. t. 292 (1786–93); *Lapeyrousia fasciculata* Ker in König and Sims, Ann. Bot. i. 238 (1805), *nomen illegitimum*.

MORAEA (subg. FUMORAEA) **Curtisae,** spec. nov. Cormus subglobosus, circa 2 cm. diam., externe fibrosus, fibrae crasse plumosae, brunneae, in collum circum basim caulis productae;

folium productum unicum, terete, substriatum, ad 37 cm. longum vel longius, 1 mm. latum, caulem excedente, basi 3–4 cm. vaginante; caulis simplex, ad 30 cm. longus, tenuis, foliis 2–4 reductis, acuminatis, vaginantibus ornatus; spatharum valvae subcompressae, acuminatae, herbaceae, marginibus subbrunneo-hyalinis, brunneo-striatae (in siccis), ad 4 cm. longae, interior quam exterior parum longior; ovarium tenue, clavatum, circa 6 mm. longum; perianthii segmenta exteriora unguiculata, tota oblanceolata, subacuta, circa 2 cm. longa, 1 cm. lata, lamina sagittato-maculata, subreflexa, segmenta interiora circa 1.4 cm. longa, 5 mm. lata, lineari-oblanceolata; styli rami 1 cm. longi, cristae lineares, circa 4 mm. longae; stigma bilobatum; stamina styli rami aequalia, antherae subapiculatae, 5 mm. longae, filamenta aequalia, subcompresso-subulata; capsula seminaque immatura. British East Africa: Kenya Colony: near Noyrosera, 40 miles southeast of Narok, 5000–7000 ft. alt., July 5, 1923, *Anita G. Curtis*, no. 676 (type, in Gray Herb.).

In its simple stem, single produced leaf, and possibly in flower-color, this plant is somewhat like *M. Mechowii* Pax, but the stem is usually shorter, the leaf is terete, the spathes shorter, and the flower very much smaller. It is perhaps more like *M. Thomsonii* Baker, but differs in having a usually shorter, simple stem, with a simple inflorescence, the spathes somewhat larger, with the outer shorter than the inner, and the style-crests rather long and almost linear. Geographically, too, it is nearer the range of *M. Thomsonii*. Unfortunately, it is impossible to state the exact flower-color, but it was probably a rather pale blue or blue-purple, with a darker sagittate mark on the outer segments near the base of the blade, as is shown in a photograph of a living flower, taken by Mrs. Curtis.

Moraea stenocarpa Schlechter in Engler, Bot. Jahrb. xxvii. 93 (1899), is there assigned to the section *Helixyra*, a point substantiated by the description of the "perianth-tube." *Moraea* does not possess a perianth-tube, but the species of this group have a prolongation of the ovary which closely resembles a perianth-tube. This section is generically distinct from *Moraea*, as was shown by N. E. Brown in Trans. Roy. Soc. S. Afr. xvii. 348–350 (1929), although the generic name *Gynandriris* must be used.[1] Accordingly, the plant becomes

Gynandriris **stenocarpa** (Schltr.), comb. nov. *Moraea stenocarpa* Schlechter in Engler, Bot. Jahrb. xxvii. 93 (1899).

[1] See Contrib. Gray Herb. cxiv. 38–41 (1936).

Like the preceding species, *M. apetala* L. Bol. was described as belonging to section *Helixyra*, so that it becomes

GYNANDRIRIS **apetala** (L. Bol.), comb. nov. *Moraea apetala* L. Bolus in S. Afr. Gard. xix. 385 (1929).

MORAEA TORTA L. Bol. was transferred to the genus *Helixyra* by Barnard in Iris Yrbk. (1932): 52 (Iris Soc. of England), and by me, in Contrib. Gray Herb. cxiv. 41 (1936), to *Gynandriris*. At that time, the original description, in S. Afr. Gard. xvii. 418 (1927), was not available to me. Since then, I have seen it and studied the figure which accompanies it, and I am convinced that it is a true *Moraea*, not a *Gynandriris*.

Through apparent inability to read my own handwriting, I typed *Acidanthera platysepala* Baker, in preparing the manuscript of page 42 in Contrib. Gray Herb. cxiv. (1936). The name intended was *Acidanthera platypetala* Baker in Journ. Bot. xiv. 339 (1876).

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5. A MISCELLANY OF NEW WORLD EUPHORBIACEAE, — II.

BY LOUIS CUTTER WHEELER

IN THIS paper the status of several genera and species of the subfamily *Phyllanthoideae* is discussed. In the subfamily *Crotonoideae* the identity of several species of the tribe *Ditaxideae* (*Chrozophoreae*), one species of the tribe *Acalypheae*, and one species of the tribe *Cluytieae* is considered. In the tribe *Euphorbieae*, genus *Euphorbia*, the application of several names is explained, and several new entities are described from Mexico and South America. Probably of greatest importance, and of concern in the Old World as well as the New, is the discussion of the proper application of *Euphorbia hypericifolia* and the names of several of its widespread relatives. A matter of particular interest in the United States is the moot question of the name of the Leafy Spurge which is shown to be *Euphorbia Esula*. The arrangement of the genera is after Pax & K. Hoffmann in Engler & Prantl, Nat. Pflanzenfam. 2 Aufl. **19c**: —. 1931.

MARGARITARIA L. f., Suppl. Pl., 66. 1781. In considering the type of this genus, Contr. Gray Herb. **124**: 35. 1939, I neglected to point out that, since the type was based on incongruous elements the genus must also be rejected under Rules, Art. 64.

MASCHALANTHUS Nutt., Trans. Amer. Philos. Soc. n. s. **5**: 175. 1837, not Karl F. Schultz, Prod. Fl. Stargardiensis, 283. 1806. It has been apparently wholly overlooked that Nuttall renamed his preoccupied genus "*Chlorolepis*" in the errata appended to the reprint of his article "*Description of new Species and Genera of Plants in the natural Order of the* COMPOSITAE, . . .", first published in op. cit., **7**: 283–453. 1840?–1841.[1] These errata were not included in the regular issue of volume seven. In absence of proof to the contrary the date of publication will apparently have to be taken as that of the regular issue. Since *Chlorolepis* was substituted for *Maschalanthus*, the two binomials, *M. obovatus* and *M. polygonoides*, were automatically placed under *Chlorolepis*. *Maschalanthus obovatus* was a name substituted for *Phyllanthus carolinensis*. Although Nuttall credited this species to Michaux, Fl. Bor.-Amer. **2**: 209. 1803, there is no evidence to indicate that Nuttall intended to rename any supposedly misapplied sense of *P. carolinensis* Walter.

In the errata mentioned above, Nuttall renamed his *Lepidanthus* (Compositae) (Trans. Amer. Philos. Soc. n. s. **7**: 396. 1841) which has been used earlier by Nees, "*Lepidotheca*," but overlooked his use of *Lepidanthus* (Euphorbiaceae), op. cit. **5**: 175. 1837. The subgenus *Kymapleura* of the genus *Macrorhynchus* (Compositae) was raised to generic rank in these errata.

MASCHALANTHUS POLYGONOIDES Nutt., Trans. Amer. Philos. Soc. n. s. **5**: 175. 1837. This species was placed in synonymy under *Savia phyllanthoides* (Nutt.) Pax & K. Hoffmann var. *α Roemeriana* (Scheele) Pax & K. Hoffmann in Engler, Pflanzenreich IV. **147**(**15**): 185. 1922. The parallel specific names of *Maschalanthus polygonoides* Nutt. and *Phyllanthus polygonoides* Nutt. ex Sprengel, Syst. Veg. **3**: 23. 1826, combined with the suggestion of the name and Nuttall's specific statement under the first that it resembled *Polygonum aviculare*, indicated that the two might be identical. Examination of authentic specimens at the Academy of Natural Sciences, Philadelphia proved this surmise to be correct. *Maschalanthus polygonoides* is identical with *Phyllanthus polygonoides* as commonly interpreted. Since *both* species assigned by Nuttall to his genus *Maschalanthus* are ordinary species of *Phyllanthus*, the following combinations are erroneous: *Andrachne* sect. *Maschalanthus* (Nutt.) Pax in Engler & Prantl, Nat. Pflanzenfam. **3**(**5**): 15. 1890; *Savia* sect. *Maschalanthus* (Nutt.) Pax & K.

[1] See E. L. Greene, Dates of publication of Nuttall's Compositae, Erythea **3**: 177–178. 1895.

Hoffmann in Engler, Pflanzenreich IV. **147**(**15**): 183. 1922. — A very generally overlooked combination is *Andrachne phyllanthoides* Coulter var. **Reverchonii** (Coulter) Blankinship, A. R. Mo. Bot. Gard. **18**: 189. 1907; based on *A. Reverchonii* Coulter, Contr. U. S. Nat. Herb. **2**: 396. 1894 (Man. West. Texas).

Phyllanthus Drummondii Small, Fl. SE U. S., 692, 1333. 1903. Type: Texas, *Drummond III 336* (New York Bot. Gard. !). This species is identical with *Phyllanthus abnormis* Baillon, Adansonia **1**: 42. 1860–1, which was based either on the same collection or on another given the same number. The description of the glands given by Baillon is unmistakable. The fragmentary condition of the type of *P. Drummondii* may account for the fact that Small did not recognize this as identical with his *P. Garberi*.

Phyllanthus Garberi Small, Fl. SE U. S., 692, 1333. 1903. Type: Cedar Keys, Florida, Apr., 1876, *Garber* (New York Bot. Gard. !). This is identical with *Phyllanthus abnormis* Baillon.

Phyllanthus **pudens** nom. nov.; based on *P. Avicularia* Small, Bull. Torrey Bot. Club **27**: 278. 1900, not *P. avicularis* Muell. Arg., Linnaea **32**: 32. 1863. These two names are no more than orthographic variants of the same name under Rules, ed. 3, Art. 70, and hence the later must be renamed. I have examined the type at New York Bot. Gard. The species is quite distinct. In Muell. Arg., DC. Prod. **15**(**2**): — 1866, *P. pudens* keys closest to *P. carolinensis* Walter.

Reverchonia arenaria A. Gray, Proc. Amer. Acad. Arts & Sci. **16**: 107. 1880 (Sept. 1, according to title page of separate). It has been generally overlooked that this was collected long ago in northern Arizona by Hough and reported by him in 1897 in a botanically obscure publication. See Yanovsky, U. S. Dept. Agr. Misc. Pub. **237**: 41. 1936. I have before me, from the U. S. Nat. Herb., the specimen which bears no data other than the following printed on the label heading: "Fewkes Exploring Expedition of 1896, sent out by the Smithsonian Institution. Plants collected by Walter Hough, Aug. 1 to Sept. 5, northeastern Arizona (Moki Reservation) and Little Colorado River." It is no. 39.

Tetracoccus Engelm. and Halliophytum I. M. Johnston. Among some of his 1938 collections of Mexican *Euphorbiaceae* which Dr. I. M. Johnston referred to me for identification were two collections of *Halliophytum*. They drew my attention to the question of whether *Halliophytum* I. M. Johnston, Contr. Gray Herb. **68**: 88. 1923, were distinct from *Tetracoccus* Engelm. ex Parry, West American Scientist **1**(**3**): 13. 1885 (Feb. 5 fide Tre-

lease & Gray, Bot. Works Geo. Engelmann, 449. 1887). It was also necessary to consider the question in connection with the preparation of the Euphorbiaceae for Dr. T. H. Kearney's Flora of Arizona. The recent discovery of *Tetracoccus ilicifolius* Coville & Gilman, Proc. Wash. Acad. Sci., **26**: 531. 1936, made a reëxamination of these two genera imperative.

In publishing *Halliophytum*, Johnston related it to *Securinega*. The relationships are closer to *Tetracoccus*, as Johnston, Univ. Calif. Pub. Bot. **7**: 442. 1922, originally thought. The ecarunculate nearly centrally attached seeds of *Securinega* readily distinguish it from *Halliophytum* and *Tetracoccus* which agree in having carunculate, nearly apically attached seeds. The distinctions given by Johnston, l. c., between *Tetracoccus* and the species he later segregated as *Halliophytum* follow:

Ovary 4-celled; sepals on female flowers linear, becoming 3–5 mm. long; leaves linear, opposite; plants glabrous throughout ..... *Tetracoccus*
Ovary 3-celled; sepals on female flowers triangular or ovate, becoming 2 mm. long; leaves spatulate or oblanceolate, alternate; young branches and fruit pubescent ..... *Halliophytum*

The characters given in the above key will be considered *ad seriatim*: 1. The following specimen of *Halliophytum* has several 4-celled capsules: 26 miles west of Mapimi, Durango, *I. M. Johnston 7783* (Gray Herb.). 2. *Tetracoccus ilicifolius* is described as having the outer sepals lanceolate or ovate, yet it has opposite leaves. 3. The leaves of *T. dioicus* may be alternate, subopposite, opposite, or even ternate on one short branch as shown by the type of the synonymous *T. Engelmannii* S. Watson, Proc. Amer. Acad. Arts & Sci. **20**: 372. 1885 (Feb. 21): Santo Thomas Hills, Baja California, Sept. 24, 1884, *C. R. Orcutt 313* (Gray Herb.). *T. ilicifolius* is described as having leaves opposite yet ovate-lanceolate to ovate which completely destroys the distinction between the correlation of leaf shape and phyllotaxy. The leaves of *T. ilicifolius* are toothed. *T. dioicus* may on occasion have some of its leaves with inconspicuous and remote but nevertheless sharp and definite serrations as shown by: Red Hills near Fallbrook, San Diego County, California, Apr. 27, 1918, *I. M. Johnston & S. B. Parish 1868* (Gray Herb.). This specimen also has both alternate and ternate leaves. 4. The ovaries of both *T. dioicus* and *ilicifolius* are tomentose and this vesture is more or less persistent on the capsules. The ovaries and capsules of *Halliophytum* are strigose. The leaves of *Tetracoccus ilicifolius* are described as sparingly villous on both sides when young.

Thus little is left of the original distinctions and the problem is resolved into a choice between erecting three genera on the flimsiest of habital and textural grounds, or the reduction of all to one sound and easily defined genus. The seeds, wherein lie so many stable characters in the *Euphorbiaceae*, show a marked uniformity in shape and developmental peculiarities. *T. dioicus*, according to Coville & Gilman, Proc. Wash. Acad. Sci. **26**: 531. 1936, usually matures but one seed in each cell. The one sheet which I have examined that had seeds, had developed 2 seeds per cell in the cells represented by the 4 seeds. The following specimen of *Halliophytum* developed 2 seeds in several cells and these bear a marked resemblance to the 4 seeds of *Tetracoccus dioicus* mentioned above: 16 miles east of Escalon, Chihuahua, Sept. 22, 1938, *I. M. Johnston 7835* (Gray Herb.). The shape of the seeds, the number maturing per cell, and the presence of the caruncle all agree in uniting *T. dioicus*, *Hallii*, and *ilicifolius* into one genus.

Tetracoccus Hallii T. S. Brandegee, Zoe **5**: 229. 1906. — *Securinega Hallii* (T. S. Brand.) I. M. Johnston, Univ. Calif. Pub. Bot. **7**: 442. 1922. — *Halliophytum Hallii* (T. S. Brand.) I. M. Johnston, Contr. Gray Herb. **68**: 88. 1923. — *Securinega fasciculata* I. M. Johnston var. *Hallii* (T. S. Brand.) Jepson, Man. Fl. Pl. Calif., 595. 1925.[1] — I am accepting the first of the above typonymous names as taxonomically valid. The following discussion considers synonymous names: *Bernardia* (*?*) *fasciculata* S. Watson, Proc. Amer. Acad. Arts & Sci. **18**: 153. 1883,[2] *nomen provisorium.* Type: 24 miles northeast of Monclova, Coahuila, Mexico, Sept., 1880, *Ed. Palmer 1233* (Gray Herb.). T. S. Brandegee, Zoe **4**: 405. 1894, continued the provisional status. The earliest validation found is *Securinega fasciculata* I. M. Johnston, Univ. Calif. Pub. Bot. **7**: 442. 1922, where it is defined in a key. Johnston's attempted new combination, op. cit., 441, is not valid since a new combination cannot be based on a name not validly published. Some taxonomists may prefer to accept the reference to the place of publication of the provisional name as validating Johnston's new name (not new combination) on p. 441 by fulfilling the requirements for publication under Rules, ed. 3, Art. 44 "(2) by the citation of a previously and effectively published description of the group under another name;". Whether a description can be validly published

[1] Title page date doubtful and not accepted by Keck, Lloydia **1**: 88. 1938, under *Horkelia truncata*, but here provisionally accepted since no question of priority is involved.

[2] Issued Aug. 15, 1883 according to cover of separate.

when the name applied to it is provisional is dubious. Also the exact meaning of "another name" is obscure. Does it mean under another *specific* name, or either the same or different *specific* name under another genus? Whatever the interpretation of Art. 44 (2), the name *Bernardia* (*?*) *fasciculata* was provisional by Watson's own statement. There may be those who will claim that Watson meant something else when he stated that the species was " . . . only provisionally referred to *Bernardia*." However, it is difficult to see how the name *Bernardia* (*?*) *fasciculata* S. Watson can be saved from the provisions of the rule passed at the last International Botanical Congress: "A name of a taxonomic group is not validly published unless it is definitely accepted by the author who publishes it. A name proposed provisionally (nomen provisorium) in anticipation of the eventual acceptance of the group, or of a particular circumscription, position or rank of a given group, or merely mentioned incidentally is not validly published." (Proc. Zesde Internat. Bot. Congr. **1**: 365. 1936.) — *Halliophytum fasciculatum* (I. M. Jtn.) I. M. Jtn., Contr. Gray Herb. **68**: 88. 1923. — *Securinega capensis* I. M. Jtn., Univ. Calif. Pub. Bot. **7**: 441. 1922, the basis of *Halliophytum capensis* (Jtn.) Jtn., Contr. Gray Herb. **68**: 89. 1923, seems to differ little except in the longer and more slender staminate pedicels, and in the larger leaves which are matched by Arizonan specimens which in turn overlap those of the type of *H. fasciculatum*. Examination of ample material of *H. capensis* might show it to be distinct.

The following contemporary statement corroborating the above-mentioned statement of Trelease & Gray concerning the date of publication of *Tetracoccus* Engelm. ex Parry, West American Scientist **1**(**3**): 13. 1885, is worth quoting: "Tetracoccus disicus [sic, error for dioicus] Parry, unfortunately secures the luxury of a synonym in Professor Watson's T. Engelmanni, published only a few days later in contributions to American botany, XII, Proc. Am. Acad., Vol. XX." (Orcutt, West. Amer. Scientist **1**(**4**): 35. 1885, Mar.). Furthermore, l. c., 32, under "Editorial Notes" is inserted "The SCIENTIST is mailed between the fifteenth and twentieth of each month." Thus it is amply demonstrated that Parry published the genus before Watson did and *T. dioicus* Parry, West. Amer. Sci. **1**(**3**): 13. 1885, was prior to the synonymous *T. Engelmanni* S. Watson, Proc. Amer. Acad. Arts & Sci. **20**: 372. 1885.

CROTON COATEPENSIS T. S. Brandegee, Zoe **5**: 249. 1908.[1] This

[1] Date of issue given at bottom of p. 243.

was based on the following collection: Cerro de Coatepec, Puebla, Mexico, Aug., 1907, *C. A. Purpus 2827*. The type is probably at University of California, Berkeley. An isotype at Gray Herbarium shows that this species is a member of the genus *Argythamnia*. Since this isotype is only in bud it is not in a state enabling more precise identification to be made.

DITAXIS DIVERSIFLORA Clokey, Bull. So. Calif. Acad. Sci. **37**: 6. 1938, is quite identical with *D. cyanophylla* Wooton & Standley, Bull. Torr. Bot. Club **36**: 106. 1909. I have seen neither type nor isotype of Wooton and Standley's species but I have seen two following collections cited in the original description. The first collection, of which I have seen 2 sheets, is labeled by Standley "*Ditaxis cyanophylla* W. & S.": south of Rito Quemado, Socorro County, New Mexico, July 24, 1904, *E. O. Wooton 2890* (U. S. Nat. Herb.); near Coyote Spring southeast of Springerville, Apache County, Arizona, June 23, 1892, *E. O. Wooton* (U. S. Nat. Herb.). The distinctions claimed by Clokey to exist between the two species will be considered *ad seriatim*: (1) Geographical separation. This does not exist in the degree supposed. There are three collections from Coconino County, Arizona: pine forests, Slate Mountains, May–Oct., 1900, *C. A. Purpus 7098* (U. S. Nat. Herb.); near Walnut Canyon, May 19, 1891, *D. T. MacDougal 82* (U. S. Nat. Herb.); near Flagstaff in the yellow pine forest, alt. 1800 m., June 17, 1901, *J. B. Leiberg 5528* (U. S. Nat. Herb.). (2) Height. The differences claimed were based on a comparison of Clokey's *specimens* with Wooton & Standley's *description*. The distinction does not exist when even the original specimens only are considered. Wooton & Standley gave an average of the variation rather than the extremes. (3) Leaves dull vs. shining. Wooton & Standley did not characterize the *leaves* as shining but rather the *stems*! (4) Absence vs. presence of water-soluble pigments. Fragments of Clokey's plants soaked for about an hour tinged the water a reddish purple. Perhaps the pH. and temperature of the water determine the solubility of the pigment. (5) Size and shape of sepals. The staminate sepals in an isotype of *D. diversiflora* (Gray Herb.) are 5–6 mm. long which is the same as those in the authentic specimens of *D. cyanophylla*. The pistillate sepals in *Ditaxis* are accrescent and in a topotype of *D. diversiflora, Clokey 8010* (Gray Herb.) some of the fruiting sepals are *over* 7 mm. long. The distinction in shape does not exist. (6) Color of petals. Wooton & Standley described the staminate petals of their plant as "light yellow" rather than "yellow" as stated by Clokey. The difference be-

tween some "whites" and "light" or perhaps pale (?) yellow is trifling and perhaps more due to speed of drying than natural pigmentation. (7) Elliptic and rough vs. spheroidal and smooth seeds. Clokey's characterization of the seeds as "elliptic" is perhaps a trifle nearer the actual shape than "spheroidal" as stated by Wooton & Standley except that ellipsoidal is the correct term for a solid. The supposed difference between the "rough" seeds of Clokey and the "smooth" seeds of Wooton & Standley illustrates well the fact that different observers will describe the same thing in diametrically opposed terms. I should describe the seeds as macroscopically smooth but dull.

The following key will separate *Ditaxis cyanophylla* from its nearest relative *D. mercurialina* (Nutt.) Coulter:

Petals present in pistillate flowers; glands in both kinds of flowers no longer than broad; sepals glabrous outside ..... *D. cyanophylla*
Petals wanting in pistillate flowers; glands linear in both kinds of flowers; sepals strigose outside ..... *D. mercurialina*

ARGYTHAMNIA P. Browne, Hist. Jamaica, 338. 1756. There have been several variant spellings of this generic name. Sprague, Kew Bull. **1928**: 345. 1928, in discussing the "correct" spelling of the genus states: "There can be little doubt that Patrick Browne intended to give a name meaning "white shrub," and that the spelling *Argythamnia* was an unintentional orthographic error on his part for *Argithamnia*." In view of the fact that *Argythamnia* is derived from ἄργυρος, silver, and θάμνος, bush or shrub, there seems to be no good reason for changing to *Argithamnia* derived from ἄργι-, white, and θάμνος, bush or shrub. Both Britton & Wilson, Sci. Surv. Porto Rico and the Virgin Islands **5**(**4**): 487. 1924, and Jepson, Fl. Calif. **2**: 418. 1936, agree that the name is derived from the Greek meaning "silvery bush" or "silver bush." Aside from the fact that *Argythamnia* is perfectly correct and hence not to be altered, if Sprague had applied in this case the admirable principle propounded by him, op. cit., 364, in the case of *Wisteria* Nuttall, that "In such cases as *Wisteria*, where opinions differ as to whether a name contains an error or not, the original spelling should be retained" the original spelling of *Argythamnia* would perforce have been retained. In the case of *Wisteria*, Sprague lists only one variant spelling while the following variants of *Argythamnia* have been used: *Argitamnia*, Adanson, Fam. Pl. **2**: 520. 1763 (in index, original spelling of Browne retained in text p. 355); *Argithamnia*, Swartz, Fl. Ind. Occ. **1**: 335, t. 8. 1797 (Browne's original spelling was retained by Swartz, Nova Gen. & Sp. Pl.

Prodr., 39. 1788, contrary to statement of Pax in Engler, Pflanzenreich IV. **147**(**6**): 78. 1912); *Argothamnia*, Sprengel, Anleitung Kenntniss Gewächse ed. 2, **2**: 369. 1817, and Linn. Syst. Veg. ed. 16, **3**: 847. 1826; *Argyrothamnia*, Muell. Arg., Linnaea **34**: 144. 1865 (basinym given on p. 148); *Argytamnia* Duchesne, Dict. Sci. Nat. **3**: 98. 1816. — See my defense, Contr. Gray Herb. **124**: 40. 1939, of the validity of the publication of *Argythamnia* by P. Browne. The type species of the genus is *A. candicans* Swartz, Nova Gen. & Sp. Pl. Prodr., 39. 1788. Britton & Wilson, Sci. Surv. Porto Rico & Virgin Islands **5**(**4**): 487. 1924, designated this species as type probably for the excellent reasons that it was the first binomial assigned to the genus and that it was based on the single species assigned (as a polynomial) by P. Browne to his genus.

ARGYTHAMNIA CLARIANA Jepson, Fl. Calif. **2**: 419. 1936. Through the kindness of the collector of the type a topotype has been deposited in Gray Herbarium: sandy ground and gravelly benches, desert hills, elevation ca. 300 feet, foot of Santa Rosa Mountains about 10 miles west of Coachella, 3 miles due west of Coral Reef Ranch, Colorado Desert, Riverside County, California, Oct. 24, 1936, *Marjorie D. Clary 1707*. There is no distinction between Jepson's species and *Ditaxis adenophora* (A. Gray) Pax & Hoffmann in Engler, Pflanzenreich IV. **147**(**6**): 65. 1912; based on *Argythamnia adenophora* A. Gray, Proc. Amer. Acad. Arts and Sci. **8**: 294. 1870, type: Sonora, Mexico, 1869, *Ed. Palmer 32* (Gray Herb.). The illustration of *Ditaxis adenophora* given by Pax in Engler, Pflanzenreich IV. **147**(**6**): fig. 12 *B*, *C*, & *D*. 1912, is good though it is to be noted that the sex is reversed on *C* & *D*. Additional collections of this rare endemic of the Sonoran Desert are: ARIZONA: mouth of Williams Fork, Yuma or Mohave County, 1876, *Ed. Palmer 519* (Gray Herb. in part, U. S. Nat. Herb.); Agua Caliente, Maricopa County, Feb. 22, 1914, *John I. Carlson* (U. S. Nat. Herb.); without particular locality, *C. C. Parry 297* (U. S. Nat. Herb.). SONORA: limestone hills, Caborca, Aug. 25, 1884, *C. G. Pringle* (Gray Herb.).

BERNARDIA VIRIDIS Millsp., Proc. Calif. Acad. Sci. ser. 2, **2**: 223. 1889. Type: San Pablo, Baja California, April 22, 1889, *T. S. Brandegee* (Field Museum 280917!). Pax in Engler, Pflanzenreich IV. **147**(**7**): 25. 1914, referred this provisionally to *B. myricifolia* (Scheele) S. Watson. Examination of the type reveals that it is identical with *B. mexicana* (H. & A.) Muell. Arg. A note on the type sheet reveals that I erred, Contr. Gray Herb. **124**: 36. 1939,

under *Croton crenulatus* M. E. Jones, in assuming that *B. Brandegei* Millsp., Proc. Calif. Acad. Sci. ser. 2, **3**: 172. 1891 (nomen nudum), was based on a specimen from San Jose del Cabo. Millspaugh originally called the type of *B. viridis*, *B. Brandegei*, but according to Millspaugh's note on the sheet this "Sp. nomen unpublished as Brandegei, as Mr. B. desired the name to be other than his." Brandegee's reason is plain since he considered the plant *B. mexicana* and reduced both *B. viridis* and its typonym *B. Brandegei* to synonymy, Zoe **4**: 406. 1894. Millspaugh's use of *B. Brandegei* was "an inadvertence" according to Brandegee, l. c.

JATROPHA ARIZONICA I. M. Johnston, Contr. Gray Herb. **68**: 89. 1923. Type: foothills of the Santa Rita Mountains, Arizona, June 25, 1882, *C. G. Pringle* (Gray!; isotype U. S. Nat. Herb.). In nine collections, including the type, in which I have dissected the flowers, there were 8 stamens, 3 in the upper whorl and 5 in the lower, with the exception of one flower which had 7 stamens, 2 above and 5 below. *J. arizonica* was described as having 10 stamens. Yet the species of which I consider it but a variety, *J. macrorhiza* Bentham, Pl. Hartw., 8. 1839, was described, correctly as confirmed by examination of an isotype at Gray Herbarium, as having 8 stamens. Also correctly described as having 8 stamens, as confirmed by examination of an isotype (Sulphur Springs, Cochise County, Arizona, 1874, *J. T. Rothrock 546* (U. S. Nat. Herb.)) is *J. macrorhiza* var. *septemfida* Engelm. in Wheeler, Rep. U. S. Geogr. Surv. west of 100th Mer. **6**: 243. 1878, which was not considered when *J. arizonica* was proposed, and to which I hereby reduce *J. arizonica*. *J. macrorhiza* var. *septemfida* differs from the species in having mostly 5–7 lobed leaves (as against 3–5), lobes narrower, sinuses deeper, margins more sharply and aristately toothed. — The following collection from Chihuahua, which confirms the report of Engelmann, op. cit., 244, of this variety from Chihuahua, has been examined: 25 miles southeast of Camargo, Sept. 24, 1938, *I. M. Johnston 7884* (Gray Herb.).

EUPHORBIA subgenus AGALOMA (Raf.) House, N. Y. State Mus. Bull. **254**: 471. 1924; based on genus *Agaloma* Raf., Fl. Tellur. **4**: 116. 1838. Type: *Agaloma corollata* (L.) Raf., based on *Euphorbia corollata* L., designated as type by Rafinesque, Aut. Bot., 95. 1840. The following subgenera are synonyms of this one:

Euphorbia subgenus *Lepadena* (Raf.) House, N. Y. State Mus. Bull. **254**. 471. 1824; based on genus *Lepadena* Raf., Fl. Tellur. **4**: 113. 1838. Type: *L. leucoloma* (Raf.) Raf., op. cit., 114, and so designated, based on *Euphorbia leucoloma* Raf., based on *Euphorbia*

marginata Pursh, 1814, not HBK 1817; so stated by Raf., op. cit., 125.

Euphorbia subgenus *Adenopetalum*. Benth. ex Heinrich Ludwig Schmidt, Über Entwickelung Blüten & Blütenstände *Euphorbia*, 17, 1906, preprint from Beih. Bot. Centralbl. **22**: 33. 1907. I do not accept as a valid combination the casual misattribution of Schmidt's "Untergattung *Adenopetalum* Benth." Under the criteria which I have urged, Amer. Midl. Nat. **21**: 528, Art. 41. 1939, for the judgment of attempted new combinations, this attempt fails since the rank of the basinym is not given and no reference is given to its place of publication. Schmidt did not define his "subgenus." Of course, a special knowledge of *Euphorbia* enables me to trace the name to *Euphorbia* section *Adenopetalum* (Kl. & Gke.) Bentham & Hooker, Gen. Pl. **3**(**1**): 258. 1880; based on genus *Adenopetalum* Klotzsch & Garcke, Monatsb. Akad. Berlin **1859**: 250. 1859, not Turcz., Bull. Soc. Imp. Nat. Moscou **31**(**1**): 416. 1858. Type: *Euphorbia graminea* Jacq., chosen here since it is the best known of the species referred to the genus by its authors. *Euphorbia* section *Adenopetalum* was an avowedly and actually superfluous name since several of Boissier's sections were cited in synonymy.

Euphorbia subgenus *Trichosterigma* (Kl. & Gke.) Jepson, Fl. Calif. **2**: 424. 1936 (reference to basinym p. 430, under *Euphorbia misera*, defined in key in English); based on *Trichosterigma* Klotzsch & Garcke, Monatsb. Akad. Berlin **1859**: 248. 1859. Type: *Euphorbia fulgens* Karwinski; designated (satisfactorily) by Millspaugh, Addisonia **2**: 4. 1917.

Euphorbia subgenus *Aklema* (Raf.) Croizat, Rev. S. Am. Bot. Montevideo **6**: 13. 1939; based on genus *Aklema* Raf., Fl. Tellur. **4**: 114. 1838. Type: *A. nudiflora* (Jacq.) Raf., based on *Euphorbia nudiflora* Jacq.

Euphorbia subgenus Poinsettia (Graham) House, N. Y. State Mus. Bull. **254**: 473. 1924; Jepson, Fl. Calif. **2**: 424. 1936, in key; based on genus *Poinsettia* Graham, New Philos. Journ. **20**: 412. 1836. Type: *Poinsettia pulcherrima* (Willd.) Graham, l. c.; based on *Euphorbia pulcherrima* Willd. ex Klotzsch in Otto & Dietr., Allg. Gartenz. **2**: 27. 1834. Croizat has made a combination for this subgenus which is superfluous under Rules, ed. 3, Art. 16: *Euphorbia* subgenus *Pleuradena* (Raf.) Croizat, Rev. S. Am. Bot. Montevideo **6**: 10. 1939; based on genus *Pleuradena* Raf., Atl. Journ. **1**(**6**): 182. 1833. Type: *Pleuradena coccinea* Raf., l. c., the only species assigned to the genus by its author, and specifically

stated by him, Fl. Tellur. **4**: 113. 1838,[1] to be its type! The action of Croizat in designating "**Euphorbia pulcherrima** (Grah.) Rauch in [Loud.] Gard. Mag. 2, n. s., 390. 1836" as type of *Euphorbia* subgenus *Pleuradena*, and hence of the genus *Pleuradena*, is certainly out of order. No one has any right to challenge the action of an author of a monotypic genus to which he assigns a single *new* species when he designates that species as type. In fact, in such a case, the sole species must automatically be the type. The fact that *Euphorbia pulcherrima* Willd. is taxonomically identical with *Pleuradena coccinea* has no bearing on the question of nomenclatural typification. — The authors given by Croizat for *Euphorbia pulcherrima* are erroneous.

EUPHORBIA (subgenus CHAMAESYCE Raf.[2]) **peruviana** sp. nov. (TAB. IIIA). Annua, glabra, sparse pilosa vel glabrata; caulibus erectis, gracilibus; foliis ovatis vel ovalibus vel oblongis, 4–8 mm. longis, subintegris vel irregulariter denticulatis, petiolis ca. 1 mm. longis; cyathiis solitariis; involucris cupuliformi-campanulatis, 1.7–2 mm. diametro, extus pilosis; glandulis transverse oblongis, 0.8–1 mm. longis; appendiculis glabris, albis, quam glandulis 1.5–2plo latioribus, irregulariter denticulatis; floribus masculis 31–41; stylis inferne 1/3–1/4 connatis, bifidis, stigmatibus ellipsoideis; capsulis sparse pilosis, acute 3-lobatis, ca. 2.3 mm. longis; seminibus (immaturis) quadrangularibus, ca. 1.7 mm. longis, laevibus.

Annual; stems 1–4, erect 4–8 cm. tall, ca. 0.5 mm. thick, pilose with partially deciduous, white, microrugulose hairs, internodes from 2.5 cm. below to a few mm. above; leaves opposite, sparsely pilose to glabrate, blades ovate, oval, to oblong, 4–8 mm. long, subentire to irregularly denticulate (at the apex), petioles ca. 1 mm. long; stipules of 1 or 2 linear segments 0.6–1 mm. long, or often obsolete; peduncles pilose, 1–4 mm. long; cyathia solitary in the bifurcations; involucres cupuliform-campanulate, 1.7–2 mm. in diam., pilose outside, hairy above inside; lobes entire, subulate, pilose, exceeding the glands; glands transversely oblong, often folded, 0.8–1 mm. long; appendages glabrous, white, a little longer than and 1 1/2–2 times as wide as the glands, margin irregularly toothed; fifth gland absent; sinus U-shaped, scarcely depressed; bracteoles several opposite each gland, free, filiform, with sparse hairs on the upper end; staminate flowers 31–41; androphores

[1] See Barnhart, Torreya **7**: 177–182. 1907, as to date.
[2] Amer. Mo. Mag. **2**: 119. 1817. Type: *Euphorbia supina* Raf., l. c., designated here.

glabrous, 1.9–2 mm. long; gynophore exserted and reflexed, pilose above; ovary 3-lobed, densely pilose; styles glabrous, 1.1–1.3 mm. long, united for 1/3–1/4 their length, bifid from only the length of the ellipsoidal stigmas to halfway; capsule sparsely pilose, sharply 3-lobed, wider below the middle, ca. 2.3 mm. long; seeds (immature), sordid white, quadrangular, ca. 1.7 mm. long, ca. 0.9 mm. tangentially, ca. 1 mm. radially, radially narrowly ovate, base obtuse, apex acute, facets macroscopically smooth but the gelatinous coat microscopically verruculose.

Type: Mount Estuquiña, northwest of Moquegua, Prov. Moquegua, Peru, alt. 1600–1900 m., Mar. 22, 1925, *A. Weberbauer 7441* (Gray Herb.).

This new species is readily distinguished from all other species of subgenus *Chamaesyce* known to me by the extremely long styles with their thickened tips.

Euphorbia (subgenus Chamaesyce Raf.) **crepitata** sp. nov. (Tab. IIIB). Perennis, glabra; caulibus numerosis, adscentibus vel erectis, gracilibus, ramosis; laminis foliorum ellipticis, ovatis, vel suborbicularibus, integris; petiolis 0.7–1 mm. longis; stipulis distinctis, linearibus, glabris, 0.3–0.5 mm. longis; cyathiis solitariis, terminalibus; involucris anguste campanulatis, 1.1–1.3 mm. diametro; glandulis transverse ovalibus vel ellipticis, 0.5–0.7 mm. longis; appendiculis angustis; floribus masculis 22–33; stylis bifidis, ca. 0.8 mm. longis; capsulis glabris, 3-lobatis; seminibus quadrangularibus, 1.4–1.5 mm. longis, in quoque latere 4–5, canalibus subregularibus.

Perennial, glabrous; stems numerous, ascending to erect, freely branching, slender (mostly 0.2–0.5 mm. thick), internodes mostly 1–3 cm. long; leaf-blades suborbicular, elliptical, to ovate, 2–5 mm. long, base inequilateral, margin entire; petioles 0.7–1 mm. long; stipules distinct, linear, glabrous, 0.3–0.5 mm. long; cyathia solitary at the tips of the branches, the peduncles disarticulating if the stem axis elongates; peduncles 0.6–2 mm. long; involucres narrowly campanulate, 1.1–1.3 mm. in diam., glabrous outside, pubescent inside at the summit; lobes pubescent inside, triangular, about equaling the glands; glands transversely oval to elliptical, 0.5–0.7 mm. long, slightly depressed in the middle, pink to reddish; appendages margining the glands evenly on the outside, entire, about half as wide as the gland and essentially the same color; fifth gland linear, 1/2–2/3 as long as the lobes; sinus very small, U-shaped, not depressed; bracteoles mostly united below into a radial row adnate to the involucre, free ends pubescent, ca. 3/4

as long as the androphores; staminate flowers 22–33; androphores glabrous, 1.3–1.4 mm. long; gynophore glabrous, soon exserted, reflexed to erect; ovary glabrous, 3-lobed; styles ca. 1/2 bifid, ca. 0.8 mm. long, the divided portion expanded in the vertical plane; capsule 3-lobed, glabrous, ca. 2 mm. long; seeds quadrangular, 1.4–1.5 mm. long, 0.75–0.9 mm. tangentially and radially, radially ovate to narrowly ovate, facets traversed by 4–5 subregular sharp transverse grooves which do not pass through the angles, coat white to sordid.

Type: dry rocky canyon floor 4 miles west of Cuatro Cienegas, Coahuila, Mexico, Aug. 24–26, 1938, *I. M. Johnston 7160* (Gray Herb.). Known only from the solitary plant in the collection cited. The following key will readily separate *E. crepitata* from its nearest relative *E. polycarpa* Benth.:

Seeds smooth or faintly wrinkled; styles not thickened at the tip . . *E. polycarpa.*
Seeds with sharp deep transverse grooves on the facets; styles markedly broadened in a vertical plane on the upper half . . . . . *E. crepitata.*

Euphorbia villifera Scheele var. **crepuscula** var. nov. (Tab. IIIC). A specie: cutis glabra, non papillata; foliis nonullis angustis; seminibus 3–4 canalibus humilibus transversalibus differt.

Annual; glabrous except for crisped hairs on some young internodes; epidermis not papillate; stems prostrate to ascending; leaf-blades 3–12 mm. long. linear to oblong or elliptic-obovate (all extremes on any one plant, the longer are the narrower except on the ultimate branchlets), base inequilateral, margin subentire to serrulate; seeds brown to whitish, quadrangular, 1.1–1.2 mm. long, 0.7–0.8 mm. tangentially and radially, ovate-oblong radially, base truncate, facets with 3–4 rounded, slightly irregular transverse ridges.

Type: palm-oak habitat, Guirocoba, District of Alamos, Sonora, Mexico, Nov. 13, 1933, *H. S. Gentry 789M* (Gray Herb.). The only other collection examined which is referable to this variety is: Cofradia, Sinaloa, Mexico, Oct. 22, 1904, *T. S. Brandegee* (Gray Herb.); distributed as *E. villifera* Scheele and referred, at least in part, to *E. villifera* var. *nuda* Engelm. by T. S. Brandegee, Zoe **5**: 209. 1905. The following key will separate the varieties of *E. villifera*:

Some of the leaves of the main stem linear or oblong-linear; seeds plainly but shallowly transversely grooved; epidermis not papillate . . . . . var. *crepuscula*
Leaves (except those of the ultimate branchlets) ovate to triangular-ovate-acute; seeds smooth or faintly wrinkled; epidermis papillate.
Herbage, especially the stems, more or less pilose . . . . . *E. villifera*
Herbage glabrous . . . . . var. *nuda*

EUPHORBIA (subgenus AGALOMA (Raf.) House) **innocua** sp. nov. (TAB. IIID) Perennis; caulibus prostratis, ramosis, 8–45 cm. longis, pilosis; foliis 4–15 mm. longis, latissime ovatis vel ovatis vel oblongo-ovatis, basi cordatis, inferne alternis et petiolatis, superne oppositis et sessilibus; cyathiis solitariis in axillis, et terminalibus; involucris late obconicis vel obconico-campanulatis, extus pilosis, 1.3–1.6 mm. diametro; glandulis 4, transverse ovalibus vel oblongis, 0.6–1 mm. longis; appendiculis pallide viridibus, quam glandulis 1–2plo latioribus, subintegris, subtus pilosis; floribus masculis 7–9; stylis bifidis, 0.6–0.7 mm. longis; capsulis profunde 3-lobatis, 2.4–2.8 mm. longis; seminibus (immaturis) ca. 1.7 mm. longis, ovoideis, leviter lacunosis.

Herbaceous perennial; stems branching 8–45 cm. long, longitudinally ribbed at maturity, pilose, median internodes up to 9 cm. long, subterminal internodes but a few mm. long; leaves 4–15 mm. long, pilose, orbicular-ovate to ovate and oblong-ovate, base cordate, lower alternate, borne on petioles up to 2 mm. long, grading into the upper opposite sessile leaves; stipules minute, glanduliform; cyathia solitary, in the upper axils and terminal; peduncles from almost wanting to 4 mm. long; involucres broadly obconical to obconical-campanulate, pilose outside, glabrous inside except for appressed hairs just beneath the glands, 1.3–1.6 mm. in diam.; lobes about equaling the glands, obtuse or triangular and acute; glands 4, transversely oval to oblong, 0.6–1 mm. long; appendages pale green, 1–2 times as wide as the gland, margining the gland in a half-moon to suborbicular shape, entire to minutely crenulate, pilose beneath; fifth gland reduced to two linear segments ca. 1/2 as long as the lobes; sinus U-shaped, depressed ca. 1/3 to base of involucre; bracteoles mostly represented by two, sometimes by only one, linear segments between each fascicle, shorter than the androphores, glabrous or nearly so; staminate flowers 7–9 per cyathium; androphores glabrous, 1.4–1.6 mm. long; gynophore pilose above, soon exserted and reflexed; ovary pilose-tomentose, roundly 3-lobed; styles ca. 0.6–0.7 mm. long, glabrous, bifid 1/3–1/2 to base, subclavate; capsule depressed-globose, strongly and roundly 3-lobed, 2.4–2.8 mm. long, pilose; seeds (immature and misshapen) ca. 1.7 mm. long, ovoid, testa with shallow smooth pits ("dimples").

Type: in sand in open fields 2 miles north of Yturria on Highway 96, Willacy County near Kenedy County line, Texas, Apr. 10, 1937, *Robert Runyon 1627* (US 1735250). The following is the only other collection seen: deep sands Refugio, Refugio County, Texas,

Mar. 9, 1916, *E. J. Palmer 9115* (Acad. Nat. Sci. Philadelphia 694167).

Although roots are lacking on both collections, the appearance of Palmer's specimen and the statement of Runyon that the root is perennial have convinced me that the plant is perennial from a probably thickened farinaceous root.

The relationships of this species were very puzzling. At first glance the plant appears to be a member of subgenus *Chamaesyce* Raf. (sect. *Anisophyllum* Roeper). The alternate lower leaves exclude it from that group. After considerable study it gradually became evident that it was closely related to *Euphorbia macropus* (Klotzsch & Garcke) Boiss. which was assigned to *E.* sect. *Anisophyllum* §*Pleiadeniae* Boissier by Boissier DC. Prod. **15**(**2**): 52. 1862, with the comment that it was intermediate between sections *Anisophyllum* and *Zygophyllidium*. The true relationships of this new species, and the geminate species *E. macropus* and *E. macropodoides* Robinson & Greenman are with *E. sphaerorhiza* Bentham through *E. biformis* S. Watson as a connecting link. The pilose capsule and pilose leaves with cordate base readily distinguish *E. innocua* from the close relatives named above which have the capsules glabrous (or if strigose, leaves linear) and glabrous to strigose leaves.

There is some confusion as to the spelling of Robinson & Greenman's epithet. It was published as "*macropodoides*," yet on the printed label of the type specimen it appears as "*macropoides*." The former spelling is to be preferred. The authors were directly responsible for the publication, but not for Pringle's labels; and according to Mr. Weatherby *macropodoides* is etymologically correct.

Euphorbia (subgenus Agaloma (Raf.) House) **succedanea** sp. nov. (Tab. IVA). Annua; caulibus erectis, 35–72 cm. altis, longitudinaliter sulcatis, glabris; foliis inferne alternis, superne oppositis, petiolis 0.5–3.5 cm. longis, laminis ellipticis vel oblongo-linearibus et linearibus, 1–4 cm. longis, integris, plerumque supra glabris, subtus sparse strigosis; cyathiis in furcis superioribus solitariis, et terminalibus; involucris latissime obconicis, 1.4–1.7 mm. diametro; glandulis 5, appendiculis albis, glabris, 1.3–1.4 mm. longis; floribus masculis 19–35; stylis bifidis, 0.7–0.9 mm. longis, clavatis; capsulis glabris, profunde 3-lobatis, ca. 3 mm. longis; seminibus 2.3–2.4 mm. longis, nigro-brunneis vel albidis, irregulariter et leviter tuberculatis, subsexangulo-pyramidalibus, basi obtusis.

Erect annual herb 35–72 cm. tall; stems longitudinally ribbed, glabrous, with alternate branches below, branched above with 3–5 subequal to unequal branches arising from nearly the same point, branches forking at the tips; leaves alternate below, opposite toward the branch tips, petioles of the main stem leaves about equaling the blades, 0.5–3.5 cm. long, mostly glabrous, blades elliptic to oblong-linear and linear, 1–4 cm. long, entire, mostly glabrous above, sparsely strigose beneath; stipules minute, distinct or united; cyathia solitary in the upper bifurcations and solitary or in threes at the branch tips; peduncles glabrous, 1–6 mm. long; involucres very broadly obconical, about as broad as long, 1.4–1.7 mm. in diam., glabrous outside except for a ring of scattered appressed hairs just below the glands, glabrous inside save for a similar ring in a corresponding position; lobes about equaling the glands, ca. as long as wide, apex obtuse or truncate, erose; glands 5, elevated, horseshoe-shaped; appendages white, glabrous, ovate, 1.3–1.4 mm. long, seeming to arise directly from the involucre with the glands arising from them, ascending, margin irregular; bracteoles essentially free, ca. 2/3 as long as the androphores, often with a few short hairs above; staminate flowers 19–35; androphores glabrous, 1.1–1.6 mm. long; gynophore glabrous, long-exserted and mostly erect at maturity; ovary glabrous, strongly and roundly 3-lobed; styles 0.7–0.9 mm. long, ca. 2/3 bifid, clavate; capsule glabrous, strongly 3-lobed, ca. 3 mm. long; seeds subhexagonal-pyramidal, apex capped by a triangular pyramid, base obtuse, color very dark brown, or irregularly overcast with a translucent sordid white gelatinous coat, surface with low irregular tubercles, 2.3–2.4 mm. long, 1.6–1.9 mm. tangentially, 1.7–2 mm. radially, elliptic-ovate radially.

Type: Telpintla, Temascaltepec, state of Mexico, Mexico, Sept. 25, 1934, *Geo. B. Hinton et al. 6580* (Gray Herb.). Other collections seen: Mexico, Michoacán: près la Huerta, vicinity of Morelia, 1900 m., Oct. 15, 1909, *G. Arsène 3107* (Gray Herb.); la Huerta, vicinity of Morelia, 1950 m., Sept. 1, 1910, *G. Arsène 5134* (Gray Herb.). Mexico: Rancho-Posadas, près Puebla, May 15, 1910, *Nicolas* (Gray Herb.).

The relationships of this species are puzzling. It seems best referred to the group called by Boissier, DC. Prod. **15**(**2**): 52. 1862, sect. *Zygophyllidium* §*Ecarunculatae*. It is easily distinguished from the other members of this group, *E. hexagona* Nutt., *E. bilobata* Engelm. and particularly *E. hexagonoides* S. Watson, by

having the leaves alternate below rather than essentially opposite throughout.

EUPHORBIA (subgenus AGALOMA (Raf.) House) **Hintonii** sp. nov. (TAB. IVB). Perennis; radice tuberosa, globosa vel ovoidea; caulibus annuis, erectis, 10–30 cm. longis, longitudinaliter sulcatis, glabris vel sparse strigillosis, prope basim umbelliformi-ramosis, superne dichotomis; inferne foliis alternis, superne oppositis, ovato-cordatis et acutis vel ovato-acutis, vel lanceolatis, integris, glabris supra, glabris vel sparse vestitis subtus, 5–18 mm. longis, petiolis 1–1.5 mm. longis; cyathiis in cymosis foliosis; involucris late obconico-campanulatis, 2.4–2.8 mm. diametro; glandulis 5, cuneato-reniformibus, ca. 1 mm. latis; appendiculis ellipticis vel ovatis, 3–4 mm. longis; floribus masculis 16–25; stylis bifidis, 1.2–1.6 mm. longis; capsulis profunde 3-lobatis; seminibus ovoideis, laevibus, brunneis, ca. 2.7 mm. longis.

Perennial from a globose to ovoid root up to 3 cm. in diam.; stems annual, erect, 10–30 cm. tall, longitudinally sulcate, glabrous to sparsely appressed-vestite, umbellately branched near the base, stems forking symmetrically above; leaves alternate below the umbellate branching, opposite above, ovate-cordate-acute, ovate-acute to lanceolate, entire, glabrous above, glabrous to very sparsely crisped-hairy beneath, 5–18 mm. long, petioles 1–1.5 mm. long; stipules minute, glanduliform; cyathia borne in loose leafy cymes of mostly 3 cyathia; peduncles 3–28 mm. long, glabrous to very sparsely crisply vestite; involucres broadly obconical-campanulate, 2.4–2.8 mm. in diam., sparsely crisply vestite outside, glabrous inside except just beneath the glands; lobes glabrous, ca. 1 mm. wide and long, slightly broader upward, exceeding the glands, summit obtuse, shallowly parted into numerous linear segments; glands broadly cuneate-reniform, ca. 1 mm. wide, surface irregularly sub-alveolate-convolute especially at the much-thickened summit; appendages elliptical to ovate and obcuneate-oblong, 3–4 mm. long, glabrous or with a few scattered hairs beneath, white to pink, margin mostly entire except the apex often sub-truncate and irregular to bluntly 2–3 toothed; bracteoles partly united, forming a radial partition adnate on its outer edge to the involucre, ca. 3/4 as long as the androphores, densely white-hairy; staminate flowers 16–25; androphores glabrous, 2.1–3 mm. long; gynophore glabrous, long-exserted and mostly at length reflexed; ovary glabrous, roundly 3-lobed; styles erect, slightly united below, 1.2–1.6 mm. long, 1/4–1/3 bifid, the tips flattened; capsules

deeply and roundly 3-lobed, 3.4–3.9 mm. long; seeds ecarunculate, ovoid, sub-acute, very slightly laterally compressed, ca. 2.7 mm. long, ca. 2 mm. tangentially, ca. 2.1 mm. radially, testa smooth, brown.

Type: Berros, Dist. Temascaltepec, state of Mexico, Mexico, July 29, 1934, *Geo. B. Hinton et al. 6257* (Gray Herb.). Additional collections: MEXICO: Dist. Temascaltepec, Mexico: oak woods, Nanchititla, Aug. 16, 1933, *Hinton 4534* (Gray Herb).; cliffs by the river, Carboneras, June 24, 1934, *Hinton et al. 6092* (Gray Herb.); oak woods, Nanchititla, July 24, 1934, *Hinton et al. 6351* (Gray Herb.).

The following key will distinguish this new species from its two closest relatives:

Stems erect; lower alternate leaves few or wanting, often narrow, entire, petioles not over 1/5 as long as the blades.
  Leaves ovate-cordate-acute to lanceolate, ovary and capsule glabrous ..... *E. Hintonii*
  Leaves all narrowly linear; ovary and capsule strigose . . *E. sphaerorhiza* Benth.
Stems weak, apparently too weak to be erect; lower alternate leaves numerous, broad (ovate to orbicular-ovate), often serrulate, petioles about half as long as blade ..... *E. muscicola* Fern.

EUPHORBIA ESULA L., Sp. Pl. **1**: 461. 1753. Of late years there has been some discussion as to whether this plant occurred in North America and, if it did, whether it were the only species known as "Leafy Spurge." C. V. Morton, "The correct name of the leafy spurge" Rhodora **39**: 49–50. 1937, stated that he had "seen no specimens of undoubted *E. Esula* from the United States" and concluded that our plants were *E. virgata* W. & K. A. L. Bakke, in an admirable study of the problem from an agricultural viewpoint, concluded that *E. virgata* W. & K. was indistinguishable from *E. Esula* L. At first I was inclined to agree with Morton. Assuming that *E. Esula* does not occur in the U. S. it is easy to identify our plants as *E. virgata* W. & K. But I have been unable to distinguish our plants from European material of *E. Esula*. As a consequence I have been forced to conclude that the Leafy Spurge of the United States is *E. Esula*.

Another aspect of the matter which has been generally overlooked is that *Euphorbia virgata* Waldstein and Kitaibel, Descr. & Icones Pl. Rar. Hungariae **1**: 176, t. 162. 1805, is preoccupied by the same name published by Desfontaine, Tableau, 204. 1804 (based on *E. mauritanica* L. *sensu* Lamarck, Encyc. Meth. Bot. **2**: 418. 1786). Typonyms of *E. virgata* W. & K. are: *Esula virgata* (W. & K.) Haw., Syn. Pl. Succ., 155. 1812, and *Tithymalus virga-*

tus (W. & K.) Klotzsch & Garcke ex Garcke, Fl. Deutschl., ed. 4, 292. 1858, not Haw., Syn. Pl. Succ., 139. 1812.

Typonyms of *Euphorbia Esula* L. are: *Tithymalus Esula* (L.) Scop., Fl. Carn. ed. 2, **1**: 338. 1772.[1] — *Esula Dalechampii* Haw., Syn. Pl. Succ., 155, 1812. — *Keraselma Esula* Raf., Fl. Tellur. **4**: 116. 1838 [2] (with the vague basinym (or alternative name?) given as "E. esula" without author). — *Esula vulgaris* Fourreau, Ann. Soc. Linn. Lyon, n. s., **17**: 150. 1869. — *Galarhoeus Esula* (L.) Rydberg, Brittonia **1**: 92. 1931.

EUPHORBIA HIRTA L., Sp. Pl. **1**: 454. 1753. This polymorphic species was said by Linnaeus, l. c., to be an inhabitant of India. It is evident from Burmann, Thesaurus Zeylanicus, 223, t. 104, & 224, t. 105 fig. 1. 1737, cited respectively as *E. hirta* and *E. pilulifera* by Linnaeus, l. c., that prior to 1753 *E. hirta* was growing in the East Indies. (The two figures cited represent merely different phases of the same species.) However, biological evidence indicates that *E. hirta* is native in the New World and introduced in the Old World. A plant with a wide natural range is likely to exhibit well-marked variations in some regions. An introduced plant is unlikely to exhibit the total range of variation of the indigene. In this case only the typical species occurs in the many collections which I have examined from the Old World. Yet in the New World there are very definite variations two of which show geographical localization. The third, var. *procumbens*, may have a zonal localization in spite of its rather wide range. The following key will serve to separate the varieties of *Euphorbia hirta*:

Capsules small, 1–1.5 mm. long; seeds 0.7–0.9 mm. long.
  Clusters of cyathia (cymules) both terminal and lateral (except in depauperate plants), on leafless peduncles; stems sparingly branched above the base, unbranched at the tip ....var. *typica.*
  Cymules terminal, or, if lateral, on *leafy* branches; stems branching freely, often forking symmetrically (or nearly so) at the tip.
    Leaves rhombic-ovate to rhombic-oblong, acute; stems prostrate to ascending, mostly with conspicuous spreading hairs .....var. *procumbens.*
    Leaves linear to broadly lanceolate, the apex tapering; stems erect, with few or no spreading hairs; Peruvian .....var. *destituta.*
Capsules large, 1.6–1.7 mm. long; seeds 1.15–1.2 mm. long; Mexican .....var. *nocens*

[1] I do not accept as valid combinations the names placed under *Tithymalus* by Hill, Hort. Kew., 172/3–4. 1768. (ed. 2. 1769 examined; "minime differt!" fide Pritzel, Thes. Lit. Bot., ed. 2, 144. 1872.) For the criteria I propose to use in judging the validity of attempted new combinations see Amer. Midl. Nat. **21**: 528. 1939.

[2] See Barnhart, Torreya **7**: 177–182. 1907 as to date.

EUPHORBIA HIRTA L., Sp. Pl. **1**: 454. 1753, var. **typica**. Type: source unknown (Linnaean Herb., not seen; photograph Gray Herbarium!). Quite typical of this widespread entity. — *E. capitata* Lam., Encyc. Meth. Bot. **2**: 422. 1786, substituted for *E. hirta* on the ground that the name was bad. — *Chamaesyce hirta* (L.) Millsp., Field Mus. Pub. Bot. **2**: 303. 1909. — *Euphorbia pilulifera* L. I *hirta* (L.) Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 425. 1917.

Euphorbia globulifera HBK, Nov. Gen. et Sp. **2**: 56 (quarto), 45 (folio). 1817. Type: Cumana, Venezuela, *Bonpland 403* (Herb. Mus. Paris, not seen; fragment Field Mus.!). The fragment is too small to show beyond doubt whether this species belongs here or under var. *procumbens*.

Euphorbia verticillata Velloso, Fl. Flum., 202. 1825, & vol. **5**: t. 16. 1827, not Poiret, in Lam., Encyc. Meth. Bot. Suppl. **2**: 611. 1811. Type: ?. The interpretation given here is based on the plate cited. — *E. nodiflora* Steudel, Nom. Bot. ed. 2, **1**: 613. 1840.

Euphorbia pilulifera L. *β discolor* Engelm. in Emory, U. S. & Mex. Bound. Surv. **2**(**1**): 188. 1859. Type: "On the Sonoita [creek] near Deserted Rancho," Santa Cruz County, Arizona, Sept. 16, 1851, *C. Wright 1842* (Missouri Bot. Gard. 144667!; isotypes Gray Herb.!, U. S. Nat. Herb.!, p. p.). Merely plants with red-spotted leaves. — *E. pilulifera* L. *l.* ["spielart"] *discolor* (Engelm.) Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 426. 1917.

Chamaesyce Rosei Millsp., Field Mus. Pub. Bot. **2**: 402. 1916. Type: along an arroyo in the vicinity of Alamos, Sonora, Mexico, Mar. 13, 1910, *Rose, Standley, & Russell 12728* (New York Bot. Gard.!). A rather stunted and perhaps overwintering plant.

Euphorbia pilulifera L. var. *guaranitica* Chodat & Hassler, Bull. Herb. Boiss. ser. 2, **5**: 679. 1905. Type: in regione cursus superioris fluminis Apa, Paraguay, Nov. 1901/2, *E. Hassler 7735* (Geneva?, not seen; isotype Gray Herb.!). A low plant with smaller leaves than usual for var. *typica*.

Euphorbia pilulifera L. *sensu* Jacquin, Icones Pl. Rar. **3**: t. 478. 1786–93; Boissier, DC. Prod. **15**(**2**): 21. 1862; J. D. Hooker, Fl. Brit. India **5**: 251. 1887; Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 423. 1917; Farwell, Rhodora **38**: 331–2. 1936; and many other authors under *Euphorbia, Anisophyllum, Chamaesyce*, and *Tithymalus*.

The following Australian forms probably belong here: *E. pilulifera* L. forma *rubromaculata*, f. *humifusa*, & f. *viridis* K. Domin, Bibliotheca Bot., Band 22, Heft **89**(**4**): 866. 1927.

Range: southern United States, West Indies and Mexico south to Argentina, widely introduced in the Old World. This plant is so common and well understood that it seems unnecessary to cite specimens. In herbaria it is often found under the name of *Euphorbia pilulifera* L.

EUPHORBIA HIRTA L. var. PROCUMBENS (DC.) N. E. Brown in Thiselton-Dyer, Fl. Trop. Afr. **6**(**1**): 497. 1911; based on *E. procumbens* DC., Cat. Pl. Hort. Monsp., 111. 1813, not Miller, Gard. Dict. ed. 8, *Euphorbia* 12. 1768. Type: probably a plant from the garden at Montpellier, France (Geneva?, not seen.) — *E. pilulifera* L. var. *procumbens* (DC.) Boiss., DC. Prod. **15**(**2**): 21. 1862. — *Chamaesyce pilulifera* (L.) Small var. *procumbens* (DC.) Small, Fl. SE U. S., 714, 1334. 1903. — Since no authentic material has been available it has been necessary to accept without confirmation the interpretation of Boiss., DC. Prod. **15**(**2**): 21. 1862. — Plate IVC, fig. 2.

Euphorbia obliterata Jacquin, Enum. Syst. Pl. Carib., 22. 1762, and Select. Stirp. Amer. Hist., 151. 1763, at least in the sense in which it was used: *E. pilulifera* L. var. *obliterata* (Jacq.) A. S. Hitchcock, A. R. Mo. Bot. Gard. **4**: 127. 1893. No authentic material has been available.

Euphorbia ophthalmica Persoon, Syn. Pl. **2**: 13. 1807. Type: Rio de Janeiro, Brazil, July, 1767, *Commerson 238* (Herb. Mus. Paris, not seen; fragment Field Mus.!). A small-leaved plant.

Euphorbia gemella Lag., Gen. et Sp. Nov., 17. 1816. Type: "Habit.[at] in N.[ova] H.[ispania]" (Perhaps at Madrid judging by Alph. DC., Phytographie, 426. 1880). Supposed by Boissier, DC. Prod. **15**(**2**): 21. 1862, *et alior* to be the same as *E. procumbens* DC. — *Chamaesyce gemella* (Lag.) Small, Fl. Miami, 110, 200. 1913.

Range: Florida, Mexico, West Indies, and South America. Judging by an ample suite of Old World specimens of *Euphorbia hirta*, var. *procumbens* does not occur outside the New World, and reports of it from the Old World must be based on depauperate plants of var. *typica*. While there is a size difference between the means of var. *procumbens* and *typica* there is an overlapping of the extremes. The distinction between the two is not primarily one of size but rather the type of branching and position of the cymules.

Representative specimens of *Euphorbia hirta* var. *procumbens* in Gray Herbarium are cited below: FLORIDA: Dade County: without additional locality, *Fredholm 5645*; Miami, May, 1877, *Garber*. MEXICO: Mexico: Salto de Agua, *Purpus 1810*. Morelos: Yantepec, *Pringle 8539, Pringle 8730*. Durango: Durango, July, 1896, *Ed.*,

Palmer 360. Yucatan: without particular locality, *Valdez 2*, *Gaumer 315*; San Anselmo, *Gaumer 2128*; Izamal, *Gaumer 1003*. GUATEMALA: Coban, Dept. Alta Verapaz, *Tuerckheim 457*. SALVADOR: Ateos, Dept. La Libertad, *Standley 23336*; San Martín to Laguna de Ilopango, Dept. San Salvador, *Standley 22474*; Volcán de San Salvador, *Standley 22830*. BERMUDA ISLANDS: Harrington Sound, *Collins 337*. CUBA: Havana, *Curtiss*, West Indian Plants, *712*; Santiago de las Vegas, *Baker & Wilson 514*. BRAZIL: without particular loc., *Riedel*, ECUADOR: Ambato, Province Tungurahua, alt. 2,600 m., *A. S. Hitchcock 21732*; vicinity of Huigra, mostly on the Hacienda de Licay, *J. N. & Geo. Rose 22543*; "in andibus Ecuadorensibus," *Spruce 5776*. Galapagos Islands, Charles Island: *Stewart 1883, 1884, 1885, 1886*, *Snodgrass & E. Heller 439*, *Svenson 171*. Galapagos Islands, Chatham Island: *Snodgrass & E. Heller 519*, *Stewart 1887*. PERU: Lima, Apr., 1882, *J. Ball*. CHILE: Tacna-Arica region, *Shepard 285*. ARGENTINA: Provincia de Salta, Dept. Candelaria: Agua Caliente, *Venturi 3695*; Aguaraz, *Parodi 9131*; Campo Durán, *Parodi 9165*. Provincia de Tucuman, Dept. Capital: Villa Lujan, *Venturi 167*. Gobernacion del Chaco: Fontana, *T. Meyer 2446*.

Many of the Galapagian plants are marked by their thin subentire and dark green leaves.

EUPHORBIA HIRTA L. var. **destituta** var. nov. (TAB. IVC, FIG. 1) Caulibus erectis, tenuibus, 14–22 cm. altis, multo ramosis et saepe bifurcatis, strigilosis vel inferne glabratis, internodiis plerumque foliis longioribus; foliis linearibus vel late lanceolatis, integris vel leviter serrulatis, 1–3.3 cm. longis, apice attenuata; cymulis in caulibus praecipuis et ramorum lateralium foliosorum apicibus terminalibus.

Type: between Piura and Ñomala, Dept. Piura, Peru, alt. 100–250 m., March, 1912, *A. Weberbauer 5953* (Gray Herb.). Additional collections: PERU, Dept. Piura: Cabo Blanco, Apr. 15, 1927, *O. Haught 150* (Gray Herb.); Tablazo, Mar. 24, 1929, *O. Haught 150* (Gray Herb.).

EUPHORBIA HIRTA L. var. **nocens** var. nov. Caulibus procumbentibus vel erectis, 7–20 cm. longis, crassis, inferne ramulosis, superne plerumque simplicibus, plerumque hirsuto-pilosis supra; foliis serrulatis; capsulis 1.6–1.7 mm. longis; seminibus 1.15–1.2 mm. longis.

Type: Loma del Zapote, vecindad de Morelia, Michoacan, Mexico, alt. 1,850 m., July 11, 1909, *G. Arsène 3038* (U. S. Nat. Herb. 1002124, probable isotype Gray Herb.). Additional collec-

tions seen: MEXICO: north of Loma del Zapote, alt. 1,900 m., vecindad de Morelia, Michoacan, Aug. 4, 1910, *G. Arsène 5732* (U. S. Nat. Herb., N. Y. Bot. Gard. p.p.); "central Mexican flora chiefly in the region of San Luis Potosi, 22° N. Lat. altitude 6,000–8,000 ft.," 1878, *C. C. Parry & Ed. Palmer 809* (U. S. Nat. Herb., Gray Herb.).

The "probable isotype" at Gray Herbarium mentioned above appears to be one of the specimens with fake data similar to those discussed by Standley, Science, n. s., **65**: 130–133. 1927, and Wheeler, Contr. Gray Herb. **124**: 36. 1939. It purports to have been collected in Rio Grande do Sul, Brazil, by *Reineck* in 1899 but it is such a perfect counterpart of the sheet at the U. S. Nat. Herb. collected by *Arsène* in Mexico, that, in view of the fact that this variety is otherwise a local Mexican endemic, it seems reasonable to suspect the data on the label.

Judging by the original description, and the statement of Boissier, DC. Prod. **15(2)**: 21. 1862, that it was distinguished from *Euphorbia hirta* by having its "capsula tertia parte majori," *E. Karwinskyi* Boiss., Cent. Euph., 6. 1860 (*Chamaesyce Karwinskyi* (Boiss.) Millsp., Field Mus. Pub. Bot. **2**: 407. 1916) may possibly be identical with *Euphorbia hirta* var. *nocens*. I have before me, from Field Museum, what is supposed to be a fragment of the Karwinsky collection for which Boissier named the species and upon which at least part of the original diagnosis was based. The capsules of this are not larger than the average in var. *typica* to which the plant may belong but the fragment is too small to ascertain certainly. A fragment of *Gregg 1092* (Field Mus.), cited by Boissier, DC. Prod. **15(2)**: 21. 1862, as belonging to *E. Karwinskyi* is also before me and it, too, is neither distinguished by large capsules nor adequate for varietal determination.

There has been much disagreement in literature as to whether *Euphorbia pilulifera* or *E. hirta* should be the name for the common tropical weed here called *E. hirta*. This debate is based on the assumption that both are the same, but more of this presently. Linnaeus, Sp. Pl. **1**: 454. 1753, published both of the above species. There are two lines of reasoning: (1) The synonyms and figures cited by Linnaeus should be taken as the types of both species rather than the specimens in his herbarium. With this assumption it is generally agreed that *E. hirta* and *pilulifera* are identical. The only question then, under the present (ed. 3, 1935) Rules is to discover which name was first reduced to synonymy. Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 425. 1917, states that

Grisebach in 1859 made the reduction first. Neither he nor Farwell, Rhodora **38**: 332. 1936, gives the reference, but elimination of Grisebach's publications in the period near 1860 reveals that the reduction was made in Fl. Brit. W. Ind. Islands, 54. 1859. (Title page date of whole work is 1864 but the work was evidently issued in fascicles, with only the last two fascicles issued as late as 1864.) Since *E. hirta* was reduced to synonymy under *E. pilulifera*, according to the assumption that the specimens in Linnaeus' herbarium should *not* be considered as the types of these species, *E. pilulifera* is the valid name until someone finds an earlier reduction in the other direction. (2) The specimens in Linnaeus' herbarium should be taken as the types of the two species. As shown by B. D. Jackson, Index to the Linnean Herbarium, 74–75. 1912, each of these species was represented by a specimen in Linnaeus' herbarium at the time the first edition of Species Plantarum was published. Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 424–5. 1917, maintains that Linnaeus' diagnosis of at least *E. pilulifera* was not original. It may not be, but in absence of reasonable proof such an assumption cannot be accepted. The characterization of "pedunculis bicapitatis" might have been drawn from the Burmann plate cited, but it is also *possible* that it could have been drawn from the Linnaean specimen of *E. pilulifera*. Furthermore, according to N. E. Brown in Thiselton-Dyer, Fl. Trop. Afr. **6**(**1**): 497. 1911, and corroborated by photographs at Gray Herbarium, there is a specimen of both species in Linnaeus' herbarium labeled respectively in Linnaeus' hand "18 *hirta*" and "19 *pilulifera*." These numbers are those of the "Diss. Euph." reprinted in Amoen. Acad. **3**: 100–131. 1756. Therefore it seems quite evident that while Linnaeus took his diagnosis of *E. pilulifera* from the thesis of his student, Johanne Wiman, there is not only no proof that Wiman did *not* have the specimen from Linnaeus' herbarium available to him but it is *known* that Linnaeus did have the specimen in his herbarium in 1753. (Wiman took his diagnosis of *E. hirta* from Linnaeus, Fl. Zeyl., 88. 1747.) Consequently it seems reasonable to take the specimens in Linnaeus' herbarium as the types. These two names have been used interchangeably and the use will fluctuate according to the earliest reduction of one to a synonym of the other which can be found. Taking the Linnaean specimens as the types, *E. hirta* is the proper name for the entity of which varieties are described above and *E. pilulifera* is a quite distinct species. For the identity of *E. pilulifera* see beyond under that name.

EUPHORBIA HYPERICIFOLIA L., Sp. Pl. **1**: 454. 1753. Type: probably from Jamaica, *Patrick Browne* (Linnaean Herb., not seen; photograph Gray Herb.!). — *Anisophyllum hypericifolium* (L.) Haw., Syn. Pl. Succ., 161. 1812. — *Euphorbia mucronata* Willd. ex Steudel, Nom. ed. 2, **1**: 612. 1840 as synonym of *E. hypericifolia*. — *Xamesike hypericifolia* Raf., Aut. Bot., 98. 1840, identity inferred from basinym of "Euph. O. [mnes]" — *Chamaesyce hypericifolia* (L.) Millsp., Field Mus. Pub. Bot. **2**: 302. 1909.

The above typonymous names have been applied to a New World plant which is glabrous except for occasional cilia on the stipules, and to probably more than one closely related Old World species with larger capsules and often vestite herbage. Examination of a photograph of the type shows that there has been a misinterpretation. The type bears cymes of only a few cyathia, which, while neither a constant character of *E. lasiocarpa* Klotzsch, nor wholly unknown in what has been called *E. hypericifolia*, is nevertheless a hint. The size of the cyathia in the type of *E. hypericifolia* is too large to admit of the customary interpretation. The heavy vesture of the type, particularly on the young stems, confirmed by the statement of N. E. Brown in Thiselton-Dyer, Fl. Trop. Afr. **6**(**1**): 498. 1911: "The type specimen in the Linnean Herbarium is more tomentose on the young parts of the stem, involucres, and capsule than in any other that I have seen" is another point of discrepancy. It is evident that *E. hypericifolia* has been misapplied. One of the first points to consider in identifying *E. hypericifolia* with the proper plant is to determine the source of the type. According to Mr. S. Savage, Assistant Secretary of the Linnean Society of London, in a letter of Jan. 13, 1939, filed at Gray Herbarium, the type of *E. hypericifolia* bears "Br[owne]" in Linnaeus' hand. According to Jackson, Index Linn. Herb., 10. 1912, this means that the specimen was collected by *Patrick Browne*, who collected in the West Indies, principally Jamaica. With this hint as to the source of the type the problem is easily clarified. There is an entirely common plant of the West Indies and Mexico to South America which matches the photograph of the type of *E. hypericifolia* and agrees with N. E. Brown's comments. It is the plant commonly known as *E. lasiocarpa* Klotzsch, Nov. Act. Nat. Cur. vol. **19** Suppl. **1**: 414. 1843. The New World plant to which *E. hypericifolia* has been customarily applied must be called *E. pilulifera* L. at least for the present.

Unfortunately I named specimens at the U. S. National Herbarium and New York Botanical Garden as *Euphorbia hypericifolia*

folia L. early in January, 1939, just before I received the photographs of the types in the Linnaean Herbarium. The proper name for these specimens seems to be *E. pilulifera* L. Examination of the type will be necessary before a certain decision can be reached. See discussion below.

The following collections in Gray Herbarium are illustrative of *Euphorbia hypericifolia*: MEXICO: Tancanhuitz, San Luis Potosi, *E. W. Nelson 4397*; San Geronimo, Oaxaca, *E. W. Nelson 2764*; Temisco, Sierra Madre del Sur, north of Rio Balsas, Distrito Adama, Guerrero, *Mexia 8811*; Yucatan, *Gaumer 882*. GUATEMALA: Lake Petén, District of Petén, *Lundell 4124*. NICARAGUA: Granada, Dept. of Granada, *C. F. Baker 179*. COSTA RICA: Rio Virilla, Prov. San José, *J. D. Smith 4942*. SALVADOR: San Salvador, *Salvador Calderón 804*. JAMAICA: Constant Spring to Bardowie, *Wm. Harris 12173*; Pedro Plains, Cornwall County, St. Elizabeth Parish, *Hunnewell & Griscom 14333*. HAITI: Ennery, Dept. Artibonite, *Leonard 8983*; Pétionville, *Leonard 4967*; Jean Rabel, *E. & G. Leonard 12789*. TOBAGO: Scarborough, *Broadway 4415*. VENEZUELA: Hacienda de Cura, near San Joaquín, state of Carabobo, *Pittier 8225*; Valencia, state of Carabobo, *Pittier 8894*; Petare and vicinity, near Caracas, state of Miranda, *Pittier 9704*; Caracas, Federal District, *Pittier 9725*. COLOMBIA: Guanabanal, Cauca Valley, Dept. El Valle, *Killip 6226*; Cúcuta, Dept. Norte de Santander, *Killip & Smith 20966*; Vuelta de Acuña, Rio Magdalena, Dept. Antioquia, *Pennell 3792*; Natagaima, Dept. Huila, *Rusby & Pennell 1187*. ECUADOR: Huigra, Prov. Chimborazo, *A. S. Hitchcock 20623, J. N. & Geo. Rose 22541*. PERU: Rio Chillón near Viscas, Dept. Lima, *Pennell 14490*; Huanuco, *Macbride 3235*; Piedra Grande Estacion near Rio Santa Domingo, *Macbride 3679*; Rio Huallaga Cañon below Rio Santo Domingo, *Macbride 4232*; Huanuco, *Macbride 3218*.

EUPHORBIA MACULATA L., Sp. Pl. **1**: 455. 1753. Examination of a photograph of the type shows that this name applies not to the small-leaved prostrate plant to which it has been generally applied but to the large-leaved erect plant variously known as *E. nutans* Lag., Gen. et Sp. Pl., 17. 1816, *Chamaesyce nutans* (Lag.) Small, Fl. SE U. S., 712, 1333. 1903; *Euphorbia Preslii* Guss., Fl. Sic. Prod. **1**: 539. 1837, *Chamaesyce Preslii* (Guss.) Arthur, Torreya **11**: 260. 1912; and *Euphorbia hypericifolia* L. *sensu* American authors for plants of the United States exclusive of southern Florida and Cameron County, Texas.

The misapplication of *Euphorbia maculata* by modern authors is

of sufficient importance and interest to warrant a detailed explanation of the proper application. That Linnaeus' diagnosis does not refer to the small-leaved prostrate plant to which it has been applied is obvious. His original diagnosis was as follows:

Caules *dichotomi*: *Ramis alternis, patentibus, supra-purpurascentibus.* Folia *ovali-oblonga, trinervia, subpilosa, serrata, altero latere maxima parte integerrima, tenera adhuc planta notata macula fusca.* Flores *axillares, solitarii, parvi, calyce rufo.*

Certainly "*folia trinervia*" does not apply to the small-leaved plant to which it has been applied, but it does apply admirably to the plant of the Linnaean Herbarium. Jacquin, Hort. Bot. Vindob. **2**: 87, t. 186. 1772, published a colored illustration of what he called "*Euphorbia maculata*" but which was really *E. supina* Raf. or some closely related species. This misapplication by Jacquin perhaps started the series of uses of *E. maculata* in an erroneous sense. The problem of how the misapplication became established in American literature was solved by the remarks of Torrey, Fl. State N. Y. **2**: 176. 1843:

"Many years ago, I sent specimens of this and the preceding species to Sir J. E. Smith, who assured me that the former agrees precisely with the original *E. hypericifolia* of *Herb. Linn.*, and that the latter is as certainly *E. maculata*. He also stated, that 'Linnaeus seems subsequently to have confounded his original smooth specimen of *E. hypericifolia* (numbered 17, as in *sp. pl. ed.* 1) with *E. maculata*: not that they are at all alike, nor is there any foundation for his remark in the 2nd mantissa, p. 392. The 1st edition of the *Sp. pl.* is here decisive authority. The original specimen of *E. maculata* is smooth, but there is a downy variety from Jamaica, from Browne's herbarium.'"

The quoted statement of Smith seems contradictory. He identified the large erect plant, common in the United States, with *E. hypericifolia*. Then, after applying *E. maculata* to the small prostrate weed, he proceeded to say that "the original specimen of *E. maculata* is smooth". According to Mr. S. Savage, Assistant Secretary of the Linnean Society, in a letter of Jan. 13, 1939, filed at Gray Herbarium, Smith even went so far as to change the name on the type of *E. maculata* to *hypericifolia*. In addition he questioned Linnaeus' own statement, Mantissa Altera, 392. 1771, that *Euphorbia maculata* resembled *E. hypericifolia*. The reason for Smith's idea is not evident. The only other basis for the Linnaean species is a Plukenet plate which at first glance might be taken for the small-leaved prostrate plant, but no scale is given

and it is easy to find specimens of the large-leaved erect plant which match Plukenet's plate. But the identity of the plate is of secondary importance since the specimen in Linnaeus' herbarium takes precedence over cited figures.

The photograph of the type shows unmistakably a large-leaved plant. It is conceivable that this plant could be the same as the later and scarcely distinct *E. hyssopifolia*, but since it probably came from Virginia where *E. hyssopifolia* does not occur, it is not likely to be that. Careful examination of the vesture of the type might enable a certain decision to be made. However, the only absolute distinction is in the seeds and they are probably lacking.

According to his notes on the Linnaean Herbarium, Asa Gray saw the type of *Euphorbia maculata* and recognized that it was not the plant known to him by that name. Nevertheless he chose to continue the misapplication.

The statement of Boissier, DC. Prod. **15**(**2**): 46. 1862, where he applied *E. maculata* to the small-leaved prostrate plant, that he had seen the Linnaean specimen, is difficult to understand.

The voluminous bibliographies given by Thellung, Bull. Herb. Boiss. ser. 2, **7**: 762–765. 1907, and Thellung in Ascherson & Graebner, Syn. Mitteleur. Fl. **7**: 465–473. 1917, for *Euphorbia maculata* L. in a misapplied sense, tempt one to smug and futile moralizations on the general uselessness of blindly assembled bibliographies for taxonomic units.

The name to be used for the small-leaved, usually prostrate plant which has been incorrectly called *E. maculata* L. is *E. supina* Raf., Amer. Mo. Mag. **2**: 119. 1817 (Dec.).

EUPHORBIA PILULIFERA L., Sp. Pl. **1**: 454. 1753.[1] Type: source unknown (Linnaean Herb., not seen; photograph Gray Herb.!). — *Tithymalus piluliferus* (L.) Moench, Meth. Pl. Suppl., 283. 1802. — *Anisophyllum piluliferum* (L.) Haw., Syn. Pl. Succ., 162. 1812. — *Euphorbia hypericifolia* L. var. *micrantha* Engelm. ex Boiss., DC. Prod. **15**(**2**): 23. 1862, as synonym of *E. hypericifolia* L. *sensu* Boiss., l. c. — *Chamaesyce pilulifera* (L.) Small, Fl. SE U. S., 714, 1334. 1903. — Boissier, DC. Prod. **15**(**2**): 20. 1862, assigns the type of this species to synonymy under *Euphorbia parviflora* L., Syst. ed. 10, **2**: 1047. 1759. N. E. Brown in Thiselton-Dyer, Fl. Trop. Afr. **6**(**1**): 498. 1911, assigns it to synonymy under *E. hypericifolia* in the broad and misapplied sense in which he was using it. Fawcett & Rendle, Fl. Jamaica **4**(**2**): 341. 1920, assign it to synonymy under *E. hypericifolia* L. *sensu* recent au-

[1] See later conclusion on page 78.

thors as to the plant of the American tropics. It is not possible to be sure from the photograph of the type whether *E. pilulifera* is applicable to the plant of the southern United States (Florida and Texas), Bermuda, West Indies, Mexico, Central America, South America (British Guiana, Venezuela, and Colombia) and Hawaii characterized by being generally, perhaps always, glabrous except for cilia on the margins of the brown membranous united stipules, and the small capsules (1.3–1.4 mm. long). There are very closely related but probably distinct plants in the Old World to which the name may belong. Linnaeus' statement "*Hatitat in* India" is not to be taken unquestioned since, as shown above, the same statement was made concerning *E. hypericifolia* yet its type came from the West Indies. For the present, until I can examine the type, I shall apply *E. pilulifera* to the New World plant mentioned above for it seems better to do that than to describe it as a new species which seems to be the only alternative if *E. pilulifera* is not applicable to the concept.

EUPHORBIA TUBEROSA J. N. Rose, Contr. U. S. Nat. Herb. **1**: 111. 1891; not L., Sp. Pl. **1**: 456. 1753, or Haw., Misc. Nat., 185. 1803. An examination of the type at U. S. National Herbarium revealed that this name is based on a juvenile specimen of *Euphorbia colorata* Engelm.

EUPHORBIA UMBELLULATA Engelm. var. MAJOR Millsp., Bull. Torrey Bot. Club 16: 65. 1889. Type: dry slopes of barranca, near Guadalajara, Jalisco, Mexico, Dec. 11, 1888, *Pringle 2065* (Field Mus., not seen; isotype Gray Herb.!). This is nothing but a robust growth phase of the species and is not worthy of nomenclatorial recognition.

ACKNOWLEDGMENTS

This study was conducted at the Gray Herbarium and is based mainly on the material there. Additional material has been either studied at or borrowed from the following: Academy of Natural Sciences, Philadelphia; Field Museum, Chicago; Missouri Botanical Garden, St. Louis; New York Botanical Garden; and United States National Herbarium. The author hereby expresses his gratitude to the curators of the above herbaria for their kindness in placing their collections at his disposal. The writer is indebted to Mr. Charles Schweinfurth for help with the Latin diagnoses, but the writer assumes responsibility for whatever errors may remain due to faulty transcription or other causes. Mr. G. W. Dillon has ably executed the drawings under the author's direction.

Explanation of Plates

Plate III. A, Euphorbia peruviana, n. sp.: 1, branchlet; 2, cyathium with mature capsule; 3, capsule, end view; 4, glands and appendages from above; 5, seed, basal view; 6, seed, lateral view, raphe on left; 7, seed, ventral view. All drawn from the type; the capsule reconstructed from the single nearly mature carpel found on the type sheet.

B, Euphorbia crepitata, n. sp.

C, Euphorbia villifera var. crepuscula, n. var.

D, Euphorbia innocua, n. sp.

B, C, & D: 1, branchlet; 2, cyathium with mature capsule; 3, capsule, end view; 4, glands and appendages from above; 5, styles; 6, seed, basal view; 7, seed, lateral view, raphe on left; 8, seed, ventral view; 9, leaf. All drawn from the respective types.

Plate IV. A, Euphorbia succedanea, n. sp.: Drawn from the type except the capsule of fig. 3, and 4, drawn from *Arsène 5134*.

B, Euphorbia Hintonii, n. sp.: Drawn from the type except the capsule of fig. 3, and 4, drawn from *Hinton 6351*.

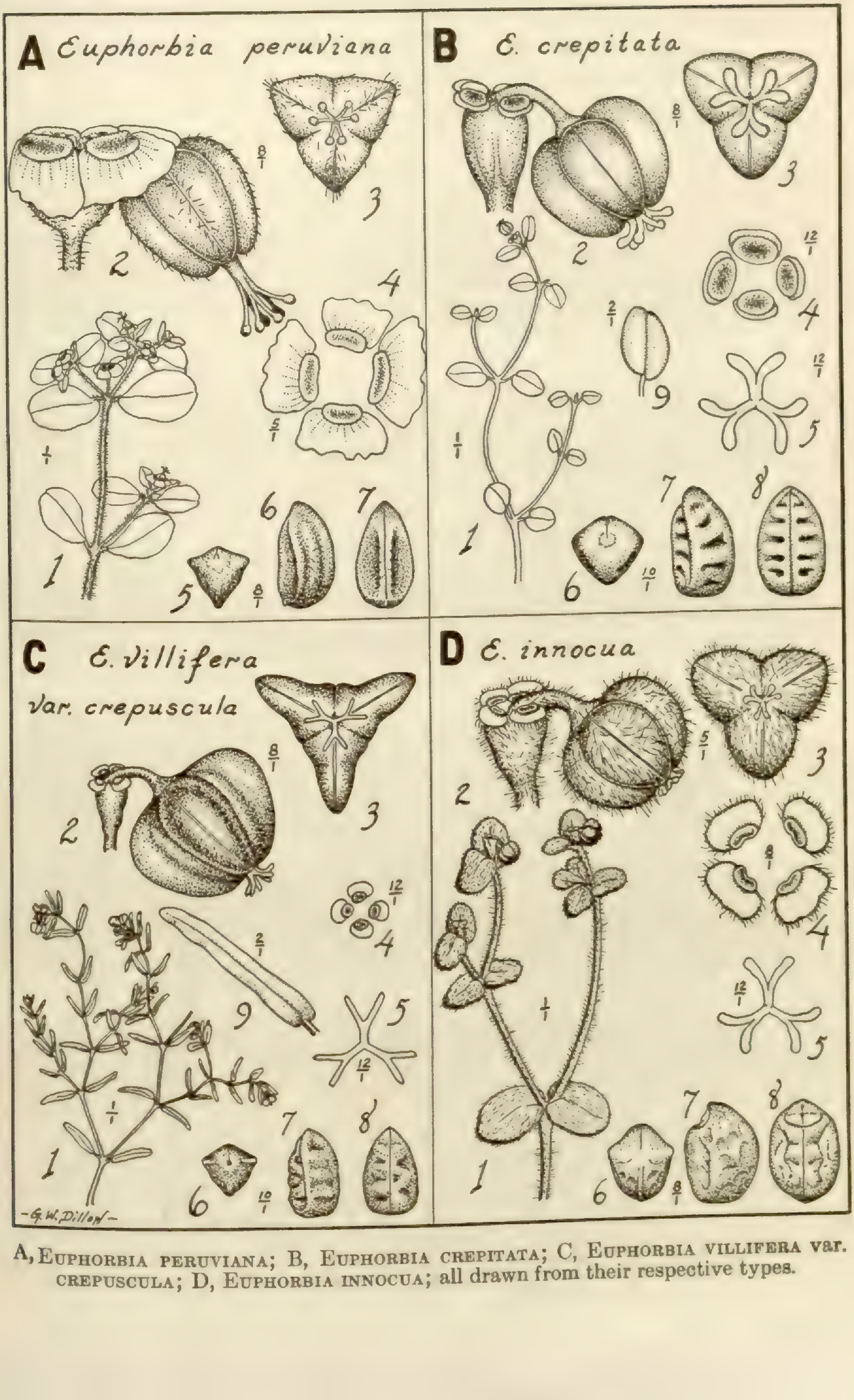
A & B: 1, segment of main stem with branch; 2, glands and appendages from above; 3, cyathium with mature capsule; 4, capsule, end view; 5, seed, basal view; 6, seed, lateral view, raphe on left; 7, seed, ventral view; 8, styles.

C, Euphorbia hirta: 1, var. destituta, var. nov; tip of stem, drawn from the type; 2, var. procumbens; tip of stem, drawn from *Curtiss 5849* (Gray Herb.).

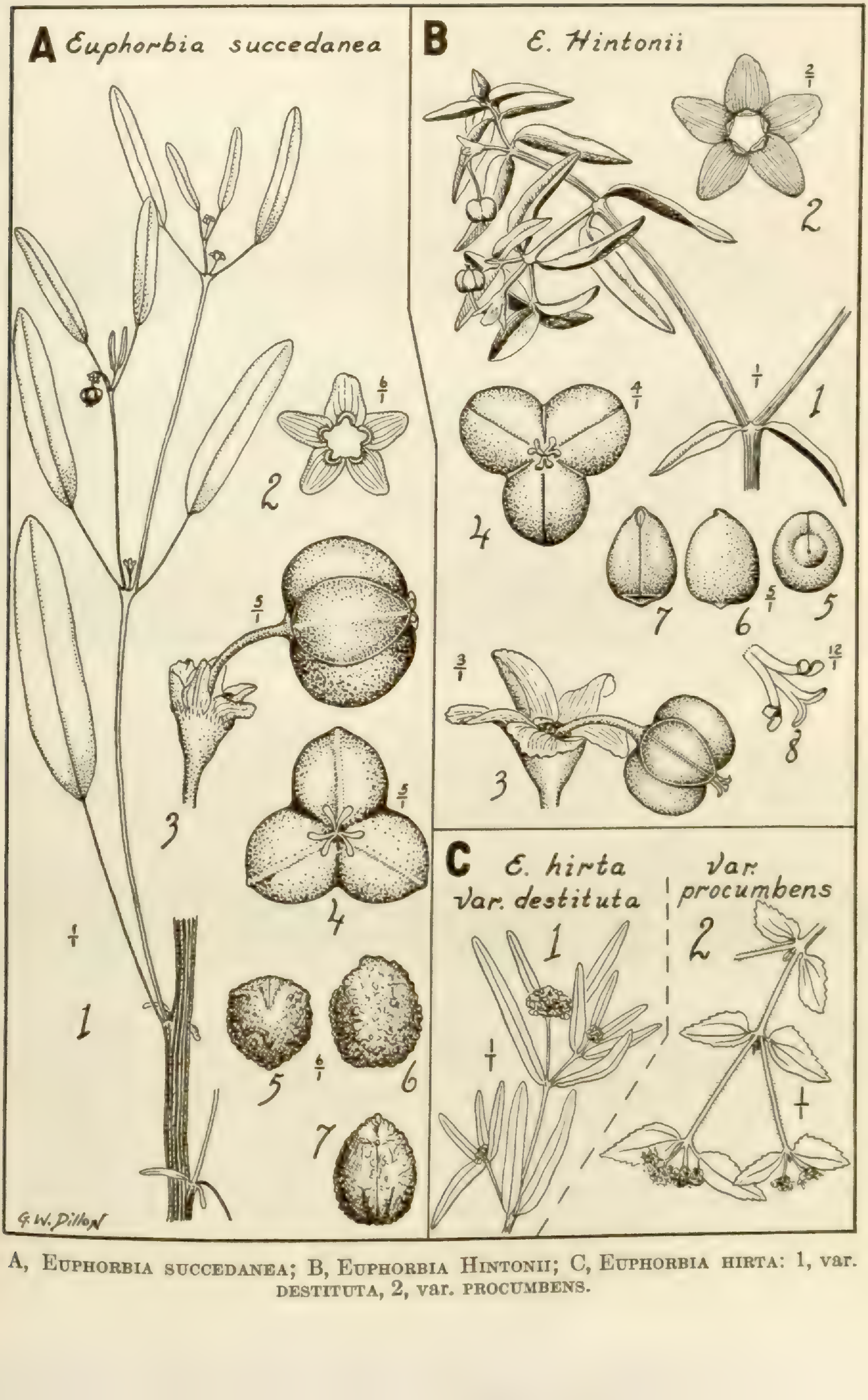
Note: Euphorbia pilulifera L. Since the above comments on the application of this name were set in type and paged, wholly unexpected evidence has been discovered. At Field Museum there is a fragment of the type of *E. pilulifera*. Careful examination of this shows that it is closely related to, but not conspecific with, the New World plant to which I had decided above to apply the name provisionally. In fact it is different from any New World species known to me. Happily there is already a name for the New World plant: **Euphorbia glomerifera** (Millspaugh) comb. nov.; based on *Chamaesyce glomerifera* Millspaugh Field Mus. Pub. Bot. **2**: 377. 1913.

Figs. 1–3, PITCAIRNIA BIFLORA L. B. Smith; 4, PITCAIRNIA PATENTIFLORA L. B. Smith; 5–7, TILLANDSIA CAPITATA Griseb. var. GUZMANIOIDES L. B. Smith; 8–10, CATOPSIS TRITICEA L. B. Smith; 11–15, CASSIA STENOSEPALA Smith & Schubert; 16–18, CASSIA TORTUOSA Smith & Schubert; 19–23, BRONGNIARTIA PROTERANTHERA Smith & Schubert.

Figs. 1–6, BRONGNIARTIA CUNEATA Smith & Schubert; 7–11, BRONGNIARTIA FUNICULATA Smith & Schubert; 12–15, BEGONIA CYLINDRATA Smith & Schubert; 16–18, BEGONIA EXTRANEA Smith & Schubert; 19–21, BEGONIA FALCATA Smith & Schubert; 22–24, BEGONIA TINCTORIA Smith & Schubert; 25–27, BEGONIA HINTONIANA Smith & Schubert; 28–30, BEGONIA ASTEROIDES Smith & Schubert; 31, 32, BREWERIA ELLIPTICA Smith & Schubert; 33, 34, IPOMOEA CORDATA Smith & Schubert.



A, EUPHORBIA PERUVIANA; B, EUPHORBIA CREPITATA; C, EUPHORBIA VILLIFERA var. CREPUSCULA; D, EUPHORBIA INNOCUA; all drawn from their respective types.



A, EUPHORBIA SUCCEDANEA; B, EUPHORBIA HINTONII; C, EUPHORBIA HIRTA: 1, var. DESTITUTA, 2, var. PROCUMBENS.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY

CXXVIII

LAST SURVIVORS IN THE FLORA OF TIDEWATER VIRGINIA

By M. L. Fernald

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CXXVIII

LAST SURVIVORS IN THE FLORA OF TIDEWATER VIRGINIA

By M. L. Fernald

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LAST SURVIVORS IN THE FLORA OF TIDEWATER VIRGINIA

M. L. Fernald

(Plates 570–583)

Part I. Itinerary of Seven Field-trips

Continuing[1] our studies of the flora of southeastern Virginia, Mr. Bayard Long and I returned to Mrs. Bowman's at Century House, south of Petersburg, where we had found a good home and a convenient center from which to reach northward, southward and eastward on the Coastal Plain. A friend of the Gray Herbarium had established for the year a special fund for carrying forward this work and, although he most modestly requests that his name be withheld, he may be assured that his gift was carefully and, we believe, fruitfully employed.[2]

Picking up the threads where we had left off in June, 1938, we worked steadily, in spite of heat and persecution by "chiggers," from

[1] For preceding papers in this series see Fernald & Griscom, *Three Days of Botanizing in Southeastern Virginia*, Rhodora, xxxvii. 129–157 and 167–189 (1935)—Contrib. Gray Herb. no. CVII; Fernald, *Midsummer Vascular Plants of Southeastern Virginia*, Rhodora, xxxvii. 378–413 and 423–554 (1935)—Contrib. Gray Herb. no. CIX; Fernald, *Plants from the Outer Coastal Plain of Virginia*, Rhodora, xxxviii. 376–404 and 414–452 (1936)—Contrib. Gray Herb. no. CXV; *Local Plants of the Inner Coastal Plain of Southeastern Virginia*, Rhodora, xxxix. 321–366, 379–415, 433–459 and 465–491 (1937)—Contrib. Gray Herb. no. CXX; *Noteworthy Plants of Southeastern Virginia*, Rhodora, xl. 364–424, 434–459 and 467–485 (1938)—Contrib. Gray Herb. no. CXXIII.

[2] Part of the gift was used in support of Mr. Robert K. Godfrey's studies of his collections from the Coastal Plain of North Carolina, yet to be reported upon.

July 12th to the 23rd, with Robert Bowman driving us in his fine new car. Many spots which, earlier in the year, had been new to us were revisited and still longer familiar localities yielded much of interest. Thus, in the calcareous and fossiliferous areas of Surry County, and especially in the rich woods along the James at Eastover, a fine old plantation-home where we were cordially received (and invited to join a bathing party in the river), we renewed the discovery on the Coastal Plain of plants which belong more generally in the Piedmont or the Appalachian Valley or on the Blue Ridge or the Alleghenies: *Ptelea trifoliata*,[1] *Houstonia longifolia*, *Campanula americana* and *Senecio obovatus*, in addition to many reported in the last paper (of 1938). On the tidal shores of the James below Scotland (at the mouth of Crouch Creek) we had a thrilling half-day, for here was the long-sought *Aeschynomene virginica* (MAP 1), very young to be sure but a splendid find, because the species had apparently been unknown in the state since its original discovery by Clayton more than two centuries ago on the Rappahannock. Furthermore, the abundant material in fine flower and fruit subsequently collected here and farther up the James in August and September and again in August, 1939, at additional stations (one on the Chickahominy) shows conclusively that true *Aeschynomene virginica*, instead of being here near its northern limit, as we supposed, is, on the James, really at its *southern* limit. The plant of tidal shores in Virginia, Maryland, Delaware, southern New Jersey and southeastern Pennsylvania (dots on MAP 1), there centering on the tidal streams entering Chesapeake and Delaware Bays, is consistent in having larger leaves, flowers and fruits than the plant (range outlined on MAP 1) growing from Texas to southeastern North Carolina and there erroneously passing as *Ae. virginica*. The latter is apparently *Ae. hispida* Willd., by which name it was correctly known until in 1888 Britton (with the passive support of Stern and Poggenberg) incorrectly reduced it, without a word of explanation and without the bibliographic references which scholarship demands, to the northeastern *Ae. virginica*.

The two species are distinguished as follows:

AE. VIRGINICA (L.) BSP. Principal leaflets 1–2.5 cm. long; flowers 1.3–1.5 cm. long; legumes strongly torulose, 3.5–7 cm. long, with stipe 1–2.3 cm. long, the segments with thick and smooth (except for dark pustular trichomes) walls, the lowest segment 0.8–1.5 cm. long and 5–7 mm. broad; seeds 4.5–6 mm. long.

[1] As in the previous papers I omit the authors of names which are in Gray's Manual.

Ae. hispida Willd.? Principal leaflets 3–9 mm. long; flowers 7–9 mm. long; legumes barely torulose, 2–5 cm. long, with stipe 3–8 mm. long, the segments with thin walls puckered over the seed, the lowest segment 5–7 mm. long and 3–4.5 mm. broad; seeds 3–3.5 mm. long.

Whether the more southern species is truly *Aeschynomene hispida*, described by Willdenow from "America *borealis*," can be settled only by study of the Willdenow type, preserved at Berlin. Professors Diels and Pilger are most accommodating in s udying for us types of critical species. In the present tragic state of trans-Atlantic transportation it is quite impossib!e to get a prompt repor. upon this type. The exact determination of the identity of *Ae. hispida* must, therefore, await a more favorable occasion. I have purposely omitted the Mexican material passing under this name from the map. The name there covers a complex series of specimens.

Close by was *Scirpus novae-angliae* (map 2), a typical plant of the coast of eastern Canada and New England, also found on the lower Delaware, but here at a new southern limit and a few rods away from a new northern station for the subtropical *Eleocharis albida* (map 3); and in the great swale back of the mouth of Crouch Creek *Carex hyalinopsis* Steud., a southern species previously unknown between North Carolina and southern New Jersey, was overripe but recognizable.

Farther to the northeast we tried for two days the Peninsula of Virginia and the Gloucester Peninsula. The former Peninsula was Grimes's territory, the latter was the region best known to John Clayton, who was clerk of the Gloucester court, unless, of course, he better knew his home-region in neighboring Mathews. It was, therefore, surprising to find many to us quite obvious plants which had not previously been noted in these areas, some of them reported for the first time so far north as Virginia only within five years. *Solidago pinetorum* Small abounded in the dry open woods and we subsequently trailed it at the margin of the Piedmont nearly to the Rappahannock. How it can have escaped notice until Small in 1903 described it from North Carolina is beyond our comprehension. *Sacciolepis striata*, a most distinctive grass, was locally abundant; *Rhynchospora caduca* Ell., one of the tallest and most beautiful of species, first detected north of the Carolinas at False Cape on the North Carolina border, in 1934, was abundant in swales near the highroad which Clayton must regularly have traveled between Mathews and Gloucester. The first piece of rich deciduous woods which we entered near Gloucester

Courthouse had a fine carpet of *Galium uniflorum* Michx., the pretty species with purple pulpy fruits which, in 1935, was recorded from Princess Anne as the first north of South Carolina. In a shallow film of water in the woods slightly south of Gloucester, near White Marsh, *Eleocharis tricostata* (map 4) abounds. When we found it in 1937 in Isle of Wight County, our station was the first known between Georgia and New Jersey. Yet it grows near the main highway between Gloucester Port and Gloucester Courthouse! On the border of the brackish marsh near the village of North (Mathews County) we had our introduction to European marsh mallow, *Althaea officinalis*. Here it is abundant and it was a gratification to handle it, for its name is familiar in our manuals, though neither Long nor I had ever met the plant. So far as I can find it is unrecorded from south of the ancient station on Long Island, New York.

Not far from Williamsburg, in a small pool in the woods toward Lee Hall, there is a fine series of all three species of *Proserpinaca, P. palustris, P. pectinata* (not seen by Grimes) and *P. intermedia* Mackenzie, new to Virginia. This pool well illustrates the problem of botanizing in southeastern Virginia. Every natural spot has to be investigated; one cannot safely pass one of them if he wishes to find all the plants. Doubtless Grimes passed this very place many times, but nothing specially called it to his attention. *Proserpinaca intermedia* is one of the puzzling plants. Clearly distinct from both *P. palustris* and *P. pectinata* it is sometimes thought to be a fertile hybrid of those two. It often occurs with them, as at this station. Again it is found quite by itself. Here is a beautiful opportunity for a cytologist to see what he can make of the situation.

It was not far from Lee Hall that we had one of our trying adventures. Between there and Yorktown lies the Naval Mine Depot, strongly guarded by a very high and durable steel-wire fence. Signs are abundantly displayed, warning of the explosives and dangers inside the fence. There is no temptation for the ordinary traveller to trespass; but suddenly we saw within the fence a *Paspalum* quite new to us (and to Virginia), with tall culms and a great inflorescence of scores of erect spikes. We couldn't scale the fence and didn't want to risk doing so, but we had to get the *Paspalum*. Finally, after vainly trying to reach it by thrusting the longest (middle) finger through a small aperture and yearningly wiggling it in the general direction of the haughty grass, we solved the problem. Long secured a crotched

branch which he managed to poke through an opening. Embracing a tall culm in the crotch he twisted and twisted, then jerked. We landed half an inflorescence, enough to settle the identity of the plant. Forced to be satisfied with that we regretfully drove on; and half-a-mile beyond our unsatisfactory poking within the Mine Depot we came to the grass outside the fence! It is only the introduced tropical *Paspalum Urvillei*, but, at least, we got real specimens; and in putting them up we were severely punished for our audacity, for the lower sheaths are heavily covered with disarticulating stiff bristles which sting like those of *Opuntia*, certainly a most unusual trait in a grass.

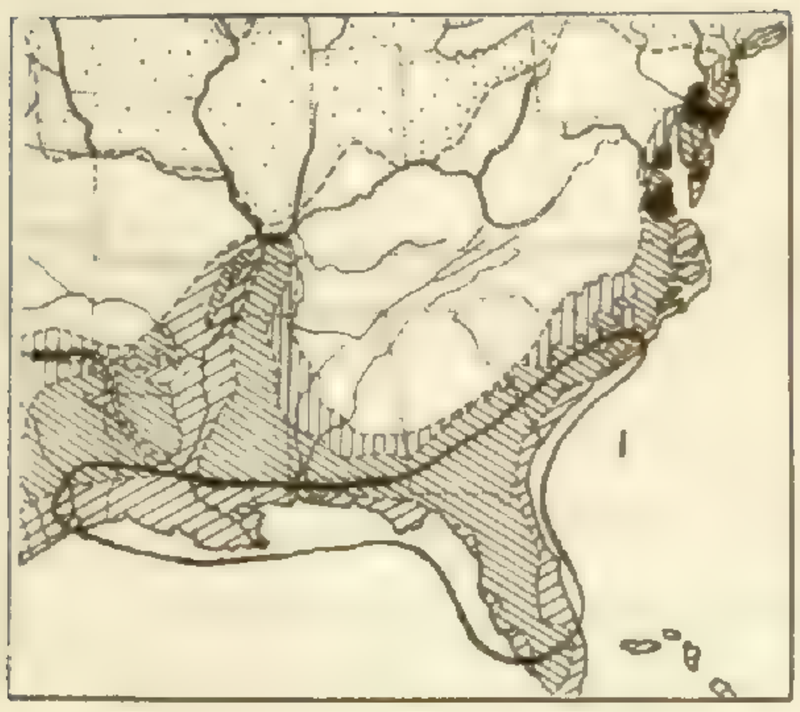
We had planned to return by driving up the Peninsula of Virginia to the Charles City ferry, but there had been heavy rains, the road was torn up and of very "slick" clay. Robert stuck gamely to the wheel until we came to an absolutely impassable tract of road, with numerous cars mired. Then we turned back and took the James City ferry. Looking up the point where we turned back we find by the map that we were slightly southeast of Hotwater. Luckily we kept out of that uncomfortable element.

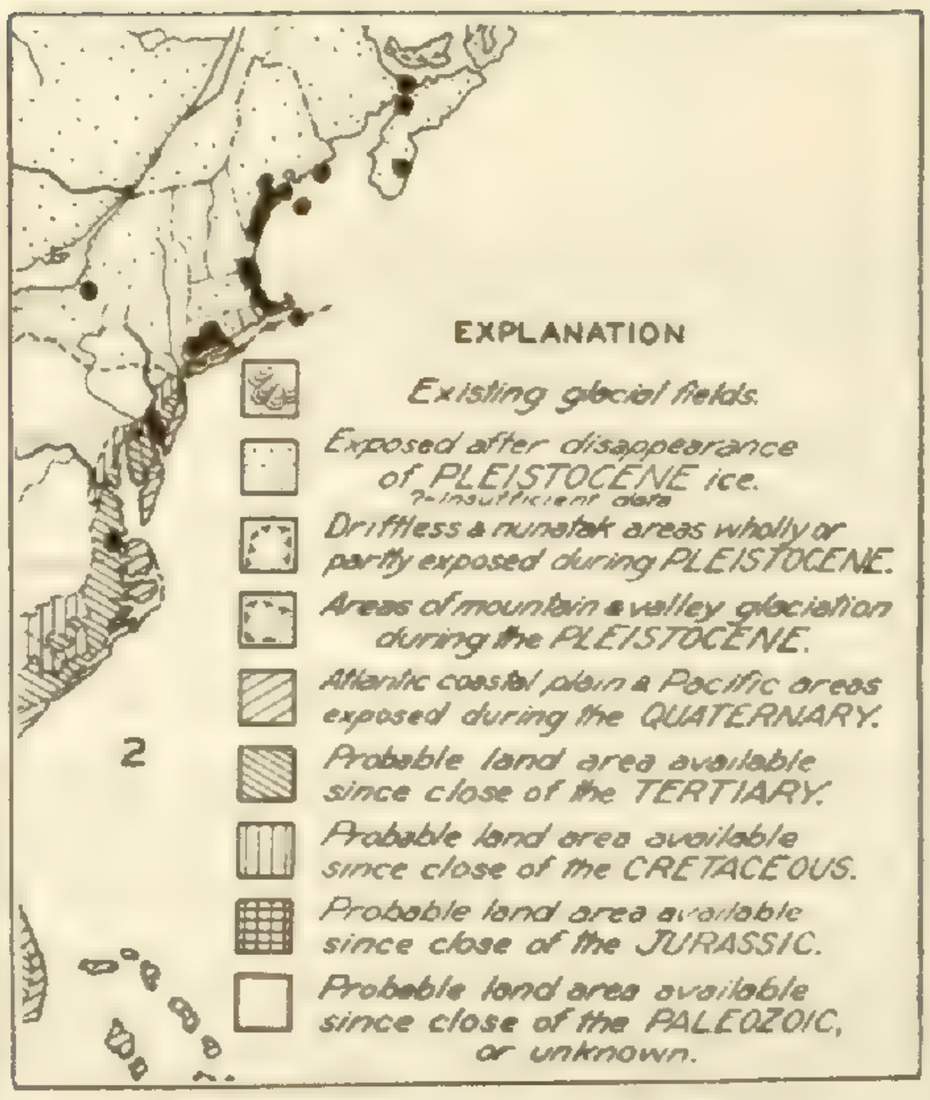
South, toward the Carolina line, we got new plants at old stations: *Hypericum adpressum* (MAP 5) abundant (new to the state) in the swampy borders of woods and clearings north of Stony Creek; *Buchnera americana* with *Panicum fusiforme* Hitchcock (first north of southern Georgia) south of Burgess, the *Buchnera* also abundant (with *Schwalbea americana*) on both sides of the line between Sussex and Greensville (south of Jarratt); *Chamaecyparis thyoides*, at perhaps the first (but not the last) station in the state known to botanists outside the Great Dismal Swamp, in wet woods bordering our pine barrens south of Franklin; the little known *Malaxis Bayardi* Fernald in dry pine and oak woods near Skipper's; *Sida rhombifolia* L., extended north from North Carolina, about Courtland; *Heterotheca subaxillaris*, not recorded between North Carolina and Maryland, about Franklin; *Polygonum pensylvanicum* var. *durum* Stanford (first north of South Carolina) in several fields. But two special areas, quite new to us, must suffice as further records of our July discoveries.

Grimes had found many good things (for instance *Parnassia asarifolia* of the mountains and *Chelone Cuthbertii* Small (*C. Grimesii* Weatherby) of the Blue Ridge of North Carolina) in the spring-fed bogs bordering Whiteoak Swamp, west of Elko Station in Henrico County. It was too early for *Parnassia* and *Chelone* but we went to

Elko the last of a very rainy afternoon to reconnoiter. I went west, Long east. I immediately came upon the little known and very definite *Thalictrum macrostylum* (Shuttlew.) Small, of the uplands, and saw that a month later the area would be a choice one. Long got into a springy sphagnum-carpeted magnolia swamp and brought back *Juncus caesariensis* Coville. Grimes had it near Williamsburg; but this station is many miles northwest of there and only the second outside the Pine Barrens of New Jersey.

The last of our July stations was a gem: "The daintiest last, to make the end most sweet." At least a dozen times we had driven over the trunk-road between Emporia and the North Carolina line and we had taken side roads in search for a good bog. One afternoon in July, having stopped at the few uncultivated spots north and south of Skipper's, I remarked that if we were to find any more southern species extending into that corner of Virginia it must be "pronto"; we were within three miles of North Carolina. Despairing of finding unaltered spots, I started up a wood-road through a conventional wooded swamp. Long stayed near the car; but in two minutes I was calling for help. I had stumbled upon a beautiful little sphagnum bog and the first glance showed that our afternoon's work was begun. *Xyris* abounded; the one with broad spiraling leaves and large bulbs covered with short brown scales, *X. platylepis* Chapman, unknown from north of South Carolina, except that we had just got it north of Skipper's; the smallest species, the rare *X. Curtissii* Malme, which a few years ago was recorded from its first station north of Georgia. An old fruiting stem (only one, much dried) could belong only to the much-named *Zigadenus angustifolius* (Michx.) Watson (MAP 6). Occurring on the Coastal Plain from eastern Louisiana to Florida, thence, as we now know, to southeastern Virginia, the plant has relict colonies on the ancient Appalachian core of eastern North America. It is an ancient type still persisting. Originally put into *Helonias*, the species has been placed at times in *Amianthium*, which it superficially resembles, at times in *Zigadenus*, with which it shares the basal glands of the perianth. It is atypical in any of them and Small, with characteristic liberality, constitutes of it the newly proposed genus *Tracyanthus*. Whether it belongs to a new or an older genus, the species is obviously old. So far as we yet know there is a single small colony of it in Virginia, precariously close to a plowed field. The lower vegetation in the bog consisted of a nearly continuous





Ranges of, map 1, Aeschynomene virginica (dots) and Ae. hispida (northeastern portion of range, below); map 2, Scirpus novae-angliae; map 3, Eleocharis albida (omitting Bermuda); map 4, Eleocharis tricostata; map 5, Hypericum adpressum; map 6, Zigadenus angustifolius; map 7, Burmannia biflora; map 8, Oxypolis ternata; map 9, Calamovilfa brevipilis and 2 varieties (1 in Virginia, 1 in North Carolina); map 10, Ampelamus albidus; map 11, Eupatorium sessilifolium, var. Vaseyi; map 12, Utricularia virgatula; map 13, Lilium carolinianum; map 14, Gentiana cherokeensis; map 15, Scirpus fontinalis (Georgia) and its variety (Virginia).

carpet of *Lachnocaulon anceps*, with *Panicum strigosum, ensifolium* and the other species of sphagnous bogs; and the rarer *Ctenium aromaticum* was there; great clumps of *Xyris flexuosa* (*X. arenicola* Small) abounded, as did *Carphephorus tomentosus* (Michx.) T. & G., *Aletris aurea*, the usual orchids, the two regular species of *Sarracenia* and their hybrid × *S. Catesbaei, Rhexia ciliosa* in profusion, and all the things which give charm to a real (but now very rare) eastern Virginian bog. Suddenly Long shouted "See what's here!" There, under *Lachnocaulon* and *Panicum strigosum*, was an unmistakable porcelain-blue flower, *Burmannia biflora* (MAP 7), based by Linnaeus on three tiny plants collected somewhere in Virginia by Clayton, and, except for an indefinite collection of Thomas Nuttall's, subsequently unknown in the state. Later visits, in August, September and October, yielded *Burmannia* in profusion. While searching for another flowering specimen (we were too early) I came upon an extraordinary plant, very slender, with two filiform petioles each terminated by two or three linear-oblanceolate leaflets, suggesting abnormally long donkey-ears. This was one of the rarest of all Umbellifers, *Oxypolis ternata* (Nutt.) Heller, described by Thomas Nuttall from somewhere in "bushy margins of swamps, in the pine forests of North and South Carolina" but known to the monographers of the family, Coulter & Rose, in 1900, only from Apalachicola, Florida! All the stations represented in the herbarium of the New York Botanical Garden and the Gray Herbarium can be counted on the fingers (only part of them); they are indicated on MAP 8. Long, with undisguised emotion, remarked, "This is the peppiest half-hour I've had for years." But "Brer Rabbit he lay low" and soon held up a fine lot of *Utricularia juncea*, real plants with character, not the nondescript specimens simulating *U. cornuta*, such as often puzzle New Jersey botanists. But it was Long who capped the climax by finding a small colony of the New Jersey Pine Barren *Calamovilfa brevipilis*, MAP 9 (only differing from the New Jersey plant in its smaller spikelets and in having the tips of the pedicels *epilis* instead of brevipilis). The only other variety of the species is a very rare plant of eastern North Carolina. These will be discussed in Part II. Thus, at the last moment, when we were on the point of giving up this particular route as worked out, we had found one of the choicest spots in all eastern Virginia (and in July of 1939 on the same road we found still another which we had unwittingly passed without detecting at least twenty times!). Not a trip has been

subsequently made to the state without calling in to see how fares our "sphagnous bog about 1 mile northwest of Dahlia." Even if nothing new is found it is a joy to see the great rarities again and to know that they are still living there.

During the August trip (14th to 25th) we promptly visited the springy sphagnous slopes and magnolia swamps near Elko Station and were surprised to find little *Xyris Curtissii* north of the James and to get *X. platylepis* which, a month earlier, had been found in Greensville County for the first time north of South Carolina. With the larger *Xyris* was *Carex Collinsii* Nutt., rare anywhere and unknown from Virginia until we found it in a bog of Sussex County. *Chelone Cuthbertii* of the Blue Ridge of the Carolinas was in splendid flower and very handsome, with rich purple corollas, and with it *Juncus caesariensis* of the New Jersey Pine Barrens was positively a common plant (much more abundant than our July observations had indicated); while the goldenrod with them proved (when flowering in September) to be typical *Solidago Elliottii* which, according to Mackenzie (in Small's Manual), had been known only from Parras Island in southeastern South Carolina; a good illustration of the mingled geographic relationships of the Coastal Plain flora. These were the high lights in late August, but along a siding near the station we gathered some good ruderals, especially *Euphorbia falcata* L., a European species apparently very rare in America, though collected some years ago, also along the Chesapeake and Ohio Railroad, by Steele in the western part of the state. It presumably follows this line across Virginia. *Chaenorrhinum minus* (*Linaria minor*) was likewise there (later found also along the Norfolk and Western, farther south), although Pennell gives its southern range in the United States as in Pennsylvania.

Somewhere north of Milford, in Caroline County, I thought I had seen from the swiftly speeding train indicators of a wet sphagnous slope. Accordingly, in spite of Long's skepticism, we went in search of it. Cross roads all the way from Woodford at the north to Bowling Green at the south were taken and miles of railroad followed in the extreme heat. We made the acquaintance of many workers along the track and of station attendants and small store-keepers. They all knew just the spot I meant, but endless following of their kindly suggestions failed to bring much to light. We were in the edge of the Piedmont and the typical Coastal Plain plants were "just not there."

A few species of the outer Piedmont as well as the Coastal Plain, like *Juncus Longii* Fernald and *Solidago pinetorum* Small, had their northern limits of range extended and we got *Najas gracillima*, whose known geographic limits have changed in every recent year; it now reaches south into Virginia! In one great area which ought to have been a good pine barren but which failed to live up to its outer appearance—dry sand and open pineland (of *Pinus virginiana*)—we were delighted to get into an extensive colony of the very rare and most distinctive *Desmodium ochroleucum*, with creamy-white flowers changing to yellowish, the fruits often spirally twisted and with some of the joints only obscurely articulated—morphologically unique among northeastern members of the genus. We were inclined to think its reputation for rarity may be due to its occurrence in areas otherwise too uninteresting to tempt a botanist! Even this discovery failed to elicit Long's comparison with other "peppy" half-hours. On this comparatively fruitless day some of our chief additions to the known flora of Virginia consisted of introduced ruderals on the railroad cinders, *Eragrostis poaeoides* and *Plantago indica* L.; while the range of *Chondrilla juncea* was extended somewhat to the south.

Another visit to the outer Piedmont showed us again very vividly how abruptly the concentrated Coastal Plain flora stops in its western extensions. Finding so many species out on the Coastal Plain but with relict or even their primary areas along the mountains, we had optimistically come to think that the outer Piedmont might perhaps share them. That this is not necessarily the case we found when we drove to Amelia Courthouse in Amelia County, to spend a very happy day with Mr. John B. Lewis, the alert and highly intelligent local naturalist. Mr. and Mrs. Lewis and their family and friends gave us a wonderful outing and Mr. Lewis took us to many choice spots. Only the merest suggestion of the Coastal Plain was apparent in the presence in one or two bogs of an occasional *Scleria* or *Rhynchospora* or of *Drosera capillaris* or *Lycopodium inundatum*, var. *adpressum* Chapm. The flora was preeminently of the Piedmont. *Crotonopsis elliptica* Willd. was new to me and to our Virginian experience but we subsequently got it on the Coastal Plain, and we were delighted to find the upland *Viburnum affine* Bush, var. *hypomalacum* Blake almost out to the Coastal Plain. But when we returned, in a few miles, from a country of two or three rare Rhynchosporas to one of twenty-five members of the genus our faith in the reality of the

Coastal Plain as a biogeographic unit was vastly strengthened! Mr. Lewis has been doing fine work in collecting the plants of Amelia; our day with him and his splendid family was an inspiration to us and we still talk of his keen knowledge of the local flora.

Back into the Coastal Plain again we proceeded, naturally, to get *Ampelamus albidus* (Nutt.) Britton of the Mississippi basin (MAP 10)! That was along the James, in Surry and Prince George Counties. At Jordan Point in the latter county it twines with the true southern and little collected white-flowered and narrow-leaved *Convolvulus sepium*, var. *repens* (see Tryon in RHODORA, xli. 421). They form a close tangle over the thickets there and, slightly below them, on the beach, *Aeschynomene virginica* occurs, the plant which so thrilled us when we got it in Surry County (p. 466). Standing in the tidal margin of the James, among the masses of *Sagittaria falcata* and other coarse plants of estuaries, there is a gigantic *Panicum*, a plant which, some years ago, had been secured over-ripe on one of the tidal creeks in Surry County. We now have good material awaiting a restudy of its section. Here also is our only station for *Rhynchospora macrostachya*. Farther north (on Cape Cod, for instance) it is typical of the most acid of quagmires and peaty pond-margins. Here, in brackish water, it seemed out of place; but we can't find it in the acid peats of southeastern Virginia, where the related *R. corniculata* abounds. Farther down river, in the Coastal Plain, we got the northern and inland *Lobelia siphilitica* along with *Campanula americana* and the other inland types, thus again demonstrating that, although the outer Piedmont is deficient in Coastal Plain types, the Coastal Plain, especially where lime prevails, is rich in inland species!

In July we had noticed that the ground nut, *Apios americana* Medikus (*A. tuberosa* Moench) occurs as two very distinct plants, one of them with dense and compact inflorescences rounded at summit (the wide-ranging and common plant); the other with lax and much prolonged tapering or spire-like inflorescences. In July the latter was too young to be convincing. Now, however, along the James in Surry County it was finely flowering; and our material from there forms the type of a well marked southern variety to be discussed in Part II. In previous seasons we had not seen *Rudbeckia fulgida* nor *Coreopsis tripteris*. Now, however (and in September), we had difficulty in avoiding them. They occur in the thickets in several counties; and their abundance where formerly we had not seen them

illustrates the importance of examining every habitat at every season! One year we found *Panicum Wrightianum* almost everywhere we went; in 1938 we did not once meet it. Well south of the James, once in Dinwiddie, once in Southampton, we came upon good colonies of the very definite *Eupatorium sessilifolium*, var. *Vaseyi* (Porter) Fern. & Grisc. (map 11) of the mountains of western Virginia, West Virginia and Lookout Mt., Tennessee. It is a striking plant with the familiar Appalachian-Coastal Plain split in its range.

East of Stony Creek, in the wet pinelands ("flat pinelands" of the Carolinians) where the boreal *Carex Buxbaumii* (northern Eurasia, Greenland to British Columbia, south, very rarely to Delaware, etc.) hobnobs with the more southern *C. Barrattii* (Connecticut to southern North Carolina, with rare upland stations in Tennessee and Alabama) and with *Juncus Elliottii* (Texas to Florida, north on the Coastal Plain to Delaware, with an isolated station in Coffee County, Tennessee) (see Rhodora, xl. 381), the water was now dried away and the pineland had a floor of almost impervious dry clay. The habitat was a bit discouraging in late August but, to our delight, it was at this season characterized by the rare southern *Manisuris rugosa* (Nutt.) Ktze., the grass with inflorescences resembling series of totem-poles. New to Virginia, the northernmost member of a tropical group, it shared the dried-out clay with *Panicum caerulescens*, a rare species more typical of the flats back of coastal dunes, a plant we had never before seen in Virginia.

August had been as hot as tradition makes it; the bogs had dried out to resistant clay-beds; the back roads had baked into almost impassable ruts. It was the most disagreeable season of the year and we looked with anticipation to September, when the nights would be cooler, the autumn-flowering groups would be developed and the "chiggers" perhaps all gone.

September proved what we anticipated. Unfortunately Robert's car was not adapted to the bad roads we needed to follow and Meade Lewis, whose car was not averse to rough roads, was permanently employed. So Mrs. Bowman secured us for September (15th to 22d) the services of an older man, incapacitated for strenuous work by serious wounds in the World War. He was by preference a squirrel-hunter. His unlimited anecdotes savored of squirrels, pool-rooms and a few war-incidents; but he knew the back country and proved a valuable help in taking us to good spots. Seeing that we had a

natural liking for wet pond-shores and bogs, he took us to such as could be reached, Long, coming to Petersburg by a new route, had spotted an open vegetation-carpeted shore north of the James, in Chesterfield County. Strickland knew just what he had seen and took us to the long-since drained millpond at the fall-line on Swift Creek, where, the dam having gone out, the once boomed bathing resort, Lakeview, had been deprived of its attraction and the shore vegetation had had its opportunity.

In the autumn of 1937, on the shores of a drained millpond in Southampton County, we were greatly excited by the botanizing and by the establishment there of new northern limits for such species as *Paspalum dissectum* and *Oldenlandia Boscii* (DC.) Chapm., the latter previously known only north to South Carolina; but we then little thought that a similarly drained millpond 45 miles to the north and beyond the James River would have the same vegetation. The residents of Lakeview, before the dam went out, had unconsciously been looking upon a colony of unusually interesting shore plants: carpets of *Eragrostis hypnoides*, *Oldenlandia Boscii*, and not merely *Paspalum dissectum* but, equally abundant and contrasting with it by its warm- instead of blue-green color and also extended north from Southampton County, *P. fluitans* (Ell.) Kunth. At one point another plant, *Hydrolea quadrivalvis*, also previously unrecorded from north of Southampton, was abundant, the tallest specimens we had ever seen. There has to be a limit somewhere, but we are anxiously awaiting notification of another broken mill-dam, to determine if these and their here unrecorded associates are the regular flora of derelict ponds throughout eastern Virginia.

The fossiliferous region of Surry County yielded additional and very extensive areas of thousands upon thousands of *Ponthieva racemosa* (Walt.) Mohr, which, although not known in Virginia before the last edition of Gray's Manual, we are coming to look upon as a frequent and abundant orchid of old calcareous woodlands; *Dirca palustris*, prevailingly a northern shrub, had its range in the Coastal Plain extended nearly to Isle of Wight County and in the old area of *Dirca*, the Canadian *Antennaria munda* and other localized species discussed in 1938, we found the northern and montane *Prenanthes altissima* pushing up out of the beds of southern *Ponthieva*. At Upper Brandon in Prince George County, another of the fine old estates on the James, we were given the opportunity to see an amazing

river-bank thicket and grove: ancient trees of *Celtis* (species to be discussed in a later paper) and the regular large trees of rich shores, with abundance of *Staphylea trifolia, Ptelea trifoliata* and other types of inland calcareous thickets; and the greatest development of *Bumelia lycioides*, var. *virginiana* Fernald we can imagine, a solid thicket of this spiny small tree (up to 4 or more meters high) so crowded with fruit that it was most difficult to make flattish specimens. *Albizzia Julibrissin*, "Mimosa", of Africa and southern Asia, of course was there, as all along the lower James; and over this strange assemblage of continental American, southern Coastal Plain and oriental trees the English Ivy, *Hedera Helix*, formed a great festoon, climbing into the highest branches and there heavily flowering. It was difficult to remember that we were merely in "Old Virginia".

Wishing to get really good material of *Parnassia asarifolia* at Elko Station we returned there; *Parnassia* was beautifully flowering, in the sphagnum beneath alders and bay (*Magnolia*), and near by we were delighted to find a good colony of the very local *Helonias bullata*, a plant of southern New Jersey, where it is a neighbor of *Juncus caesariensis* (abounding here), and of the Blue Ridge, where it is a near neighbor of *Parnassia asarifolia*. These were in the general vicinity of the austral *Xyris platylepis* and *Solidago Elliottii* and the Blue Ridge *Chelone Cuthbertii* already noted. They made an impressive assemblage and we sought for index-species which might lead us to another such station. The formula which resulted, "find a thicket of *Alnus serrulata*, with *Sphagnum*, Marsh Fern, *Carex leptalea* and *Aster novi-belgii*", is not likely to give complete satisfaction. If it does, the deciding factors will doubtless include the cold springs which seep out where the superficial sands and peats meet the impervious clay underneath, with sufficient slope in the background and a great wooded swamp below. The sphagnous swales in September were glorious with *Lobelia glandulifera* (Gray) Small. We had got quite used to this beautiful species with large azure-blue corollas, but the thousands of fine plants at Elko with racemes up to 4.5 dm. long are worth going a great distance to see. The wet margin of Whiteoak Swamp gave us fruiting *Styrax americana*, probably at its northern limit, and near it was the northern and inland *Bidens comosa*.

So striking is the occurrence of typical montane plants here and elsewhere on the Coastal Plain that I am tempted to interrupt the narrative, in order to moralize upon some aspects of botanical observation.

In August, 1828, William Oakes, writing to his friend, Dr. James W. Robbins, said: "The greater part of July I have spent 'down East', even as far as Quoddy Head which lieth more eastward than Eastport. I have seen there however but few plants new to N[ew]. E[ngland]. & am convinced that no great accessions to the N. E. Flora, and of absolutely new plants hardly any, are to be expected from the State of Maine."[1] That was before my day, but as a school-boy I began the discovery in Maine of plants Oakes had never dreamed of and we now know from that state, so completely dismissed by Oakes from the botanical map, no less than 115 native species which are found nowhere else in New England.

In 1882, when the American Association met at Montreal, an excursion was made down the St. Lawrence and up the Saguenay. Reporting on this excursion through an area rich in endemics, an active botanist of the time said: "Probably the prevailing feeling among botanists at Montreal, from 'The States', was one of surprise and disappointment that the Canadian flora was so familiar. At Montreal I noticed nothing of interest."[2] In view of the amazing group of endemic species along the St. Lawrence above, at and below Montreal, one can only infer that the botanical visitors of 1882 were not inclined to get their shoes muddy.[3] The estuary of the St. Lawrence is now known to share with that of the Delaware great distinction for its endemic flora. Had the visitors from "The States" put on waterproof boots and gone to the shore near Montreal they would have seen an *Epilobium* which is almost not an *Epilobium*, because its seeds have no coma, and a *Bidens* which is almost not a *Bidens* because its achenes have no awns.

In 1884 the distinguished Canadian geologist, A. P. Low, describing one of the most impressive areas in Gaspé, wrote "The top of Mount Albert is nearly flat, and is rent by a deep gorge on the east, which,

[1] Wm. Oakes to J. W. Robbins in letter now at the Gray Herbarium.

[2] Quotation long ago noted, but source not identified.

[3] The fear of soiling one's shoes calls to mind an incident which may never have a better opportunity for recording. In the summer of 1903 I was visiting the distinguished paleobotanist, Graf zu Solms-Laubach, at his simple university professor's home in Strassburg. Count Solms was keenly interested (or politely seemed to be) in my Gaspé explorations and went so far as to say: "The Gaspé region is the one part of America which might induce me to cross the Atlantic. I want to see the stations where Logan got all those fossils." I naturally urged his joining me in the summer of 1904, for canoe- and camping-trips on the Gaspé rivers. But no! "It is impossible." But why, I asked, only to receive the same decisive negative. Upon my urging that he was a bachelor, without special family responsibilities, Count Solms finally explained: "I hear that in America you black your own boots. I couldn't sink so low as that."

near its head, splits into several smaller ones. The sides of these gorges are quite destitute of vegetation."[1] Determined to study the plants of an area "quite destitute of vegetation", my companions and I, in the past, have made three expeditions to the treeless gorges and walls of Mt. Albert and the flora which characterizes them is so unique that at least one botanist has crossed the Atlantic to investigate its components. In this, as in so many other cases, the flora is highly interesting but the "vegetation" has been thought to be lacking.

Now come nearer home, to Virginia. Similar sweeping generalizations, without crawling on hands-and-knees closely to inspect the smaller and most interesting plants, have been made regarding the flora of the Old Dominion. In mid-August and September of 1843 my distinguished predecessor, Asa Gray, accompanied by William S. Sullivant, undertook a reconnoisance of the mountains from northern Virginia southwestward. In a letter to Hooker, Gray outlined his route: "I leave home this afternoon for New York, on my way to the Alleghany Mountains in the north of Virginia, where I expect to meet my excellent friend Mr. Sullivant, of Ohio. We hope to trace the more westerly ranges of the mountains down to North Carolina and Tennessee, to revisit my old ground in Ashe County, etc., and to continue our journey farther south into Georgia, coming out at Augusta on the Savannah River; thence I may go to Charleston and return by water. But if time allows I shall perhaps run through upper Georgia and Alabama, to the Tennessee River, down that to the Ohio, and thence home."[2] That of course could not have been an intensive exploration of the flora in six weeks; and on September 30th Gray wrote to Torrey from Asheville: "I doubt if I got anything of much interest in Virginia," except four species specially noted; but the glories of the mountains around Asheville, North Carolina, were much emphasized, the botanical rarities including "a little clump of Schweinitzia . . . but . . . no more", *Buckleya*, *Stewartia pentagyna*, and *Parnassia asarifolia*. Gray little realized that in western Virginia, where he reported that he did not get "anything of much interest", all four of these specialties are found. Furthermore, he was not recording his impressions of Tidewater Virginia, where he did not botanize, and he certainly did not realize

[1] A. P. Low, Geol. and Nat. Hist. Surv. Canada, Rep. for 1882–84, 7F (1884).
[2] Jane Loring Gray, Letters of Asa Gray, i. 306 (1893).

that fine colonies of the Schweinitzia, the Stewartia and the Parnassia occur on the much neglected Coastal Plain of the state.

John Clayton, more than two centuries ago sent to Leiden from Tidewater Virginia, as well as from the Shenandoah Valley and points between, hundreds of specimens; and upon these, and earlier collections of Banister, Linnaeus based nearly 400 species of North American plants. After Clayton's time no consistent or long-continued study of the Tidewater region of the state was undertaken until Kearney's famous work on the Dismal Swamp area; and in 1909 one of the most active botanists of the extreme Southern States (Georgia, Florida and Alabama), knowing Virginia chiefly from the car-window, thus dismissed the flora of the Coastal Plain: "The pine-barrens of New Jersey and those of the southeastern states have been celebrated botanizing grounds for a century or more; but in the corresponding regions between the Delaware and Roanoke Rivers there seem to be very few typical pine-barren plants, or other species, which are not more common elsewhere. It is not surprising therefore that comparatively little has been published about this region."[1]

William Oakes disapproved of the state of Maine as the possible home of localized plants because, in his inexperience, he had made only a brief wagon-trip into the most sterile and glacially most denuded corner of the state. The botanists visiting Montreal and the estuary of the St. Lawrence in 1882 missed all the interesting natives because they did not go to the primitive and undisturbed habitats; any one seeing only the nibbled roadsides and the closely farmed or browsed clearings of Quebec would gain the same superficial impression. A. P. Low, looking in vain for what he considered "vegetation" in the ravines of Mt. Albert, completely missed the remarkable endemic and epibiotic species which there make up the flora. Asa Gray, trying in six weeks to cover the whole Appalachian region from northern Virginia to Alabama, and incidentally to take in Charleston and the Tennessee valley, could pick up only the obvious. Harper, riding across different sections of Tidewater Virginia chiefly by train, could not recognize *Burmannia*, *Hypoxis micrantha*, *Xyris Curtissii*, *Juncus caesariensis*, *Pyxidanthera*, *Eleocharis Lindheimeri*, *Juncus abortivus*, *Festuca paradoxa*, *Spiranthes ovalis*, *Oxypolis ternata* and the hundreds of other notable species which linger in isolated and rare spots which have escaped alteration by man.

[1] R. M. Harper in Torreya, ix. 217, 218 (1909).

Could we see eastern Virginia as it lay before Banister and Clayton there would be no dearth of botanically significant localities; but, unhappily for our reconstruction of the native flora as John Smith found it and as Banister and Clayton knew it, we have to work with almost insignificant remnants of the original flora. These are the lingering colonies, sometimes of a few individuals, sometimes patches a full rod in diameter, sometimes rare carpets of an acre or more, which, through the doubtful advantage that their tiny remnants of the ancient habitats are too wet or too dry for cultivation or otherwise not tempting as agricultural land, house-sites, hog-wallows and cow-pastures, have not yet been obliterated by man. To the great disadvantage of the original native flora of Tidewater Virginia man has there been altogether too progressive, not to say aggressive. Look at much of Norfolk County or the northeastern half of Nansemond County—mile after mile of closely farmed land, with scarcely a spot where conservative plants of specialized habitats can persist; and when a remnant of bog, too wet and sour for cultivation, is found, deep ditching has so lowered the water-table that the original rare plants have died out or hogs have been turned in because of the unlimited supply of water.

If we happen to belong to that excessively pragmatic group which sees value only in the economically profitable plants, the miles and miles of cotton-, tobacco- or peanut-fields, with their weed-floras of cocklebur, ragweed and Bermuda grass, will be wholly satisfying. If, perchance, we see interest only in the bulk-vegetation of aggressive or dominating species (those which hold their own in spite of man's activity) we shall be quite satisfied with the pastured woods of *Pinus Taeda* or *Quercus stellata* or *alba* and the pig-inhabited gum-swamps; and our greatest thrills will come in occasionally discovering a showy clump of cardinal-flower, wild azalea or lupine. If, however, we have a feeling for the real rarities we will pass the cardinal-flower and the lupine with a familiar nod and search for the more retiring and rarely seen species which to the layman are quite unknown. The reason is not simply the hunt for something others do not possess. To the scientist, whose mind has reconstructed the history of life in North America since the close of Permian time, roughly 100,000,000 years ago, every such plant fits into the picture and becomes a telling witness to the immutability of life in spite of perpetual destruction. In order to make my point clear let us review most briefly the story of our flora since the Permian.

It is generally recognized that many, if not all, the present great groups of flowering plants were well developed in Cretaceous time. So generally are remnants of many still-living groups found among early Cretaceous fossils that we are forced to the belief that they had come from ancestors of a still earlier period, presumably Permian or Jurassic; and many paleobotanists have even postulated a lost or unrecognized geological epoch in order to account for the sudden appearance in the Cretaceous of so many forms which cannot be traced back to recognized progenitors. Those who have reconstructed the Permian world show us two vast northern lands, Eria and Angara, with east-to-west seas separating them from southern Gondwana. By mid-Cretaceous time the Permian continents had become more broken: Australia (then expanded to include New Zealand) had become isolated from connection with other lands and the east-to-west median sea had severed, by a northward extension, North America into a northeastern mass, Laurentia, which connected by way of Greenland with Baltica and Angara and at the southwest terminated with the Appalachian and Ozark regions; and a western or Pacific land with a northwestern arc confluent with eastern Angara. At that time many groups now considered tropical or warm-temperate types were in the Arctic as well as on Australia, Ethiopia, Amazonia and the northern land-masses. Australia, early cut off from connection with other lands, shows the antiquity of its flora and fauna through the presence of a vast number of primitive groups and the absence of more modern types; on account of its archaic indigenous life Australia is often spoken of as "still in the Cretaceous".

Returning to North America, it becomes highly significant that on the southeastern portion of the continent we still retain a vast number of groups which in the Permian or the Cretaceous were in the Arctic but which also reached Australia before its severance from northern lands, while our opossum is our best known remnant of the ancient marsupials, which are so characteristic of the Australian fauna. Strikingly enough these groups, common to southeastern North America and ancient Amazonia, Ethiopia and Australia, are absent from the western half of the continent, the intrusion of the Cretaceous sea between eastern and western North America evidently cutting off the connection. We are, therefore, wholly justified in looking upon those groups which characterize Australia and eastern North America to the exclusion of western North America as relics, or at least de-

scendants, with us of the Cretaceous (perhaps Permian) life which radiated out of the North, eventually to spread to the antipodes.

Concentrating more closely upon eastern North America we find that the areas we call the Appalachian Upland and the Ozark Upland have been uninvaded by seas since the beginning of modern groups of plants and animals. While Cretaceous and then Tertiary seas occupied the lower levels bordering these ancient rock-cores and Pleistocene ice accumulated to the north, much of the Appalachian and Ozarkian cores remained uninvaded. In other words, these ancient cores have been areas for occupation by plants with no interruptions, except by uplifts, since the Permian and Cretaceous types first inhabited them.

This subject has been several times developed and I do not propose now further theoretical discussion of it. My present purpose is to call attention to the very large number of these last remnants of ancient floras which have moved out from the old Appalachian (or from the Ozark) axis into the Coastal Plain. In some cases, like *Liquidambar, Taxodium, Nyssa, Liriodendron* and *Sassafras,* there is absolutely no need of special protection or conservation. In spite of their great age and their dying out through geological time in much of the terrain they once occupied, they are still virile and, in case of Sassafras, even aggressive in our area.

Dramatically interesting and phylogenetically important as is this Mesozoic forest, still virile and dominating with us, it is with the rarer and rapidly dying and overlooked aristocrats in the flora of Tidewater Virginia that I am chiefly concerned. These are the plants so rare or so insignificant that only the trained students of a flora ever see them. It so happens that Asa Gray, expanding the range covered by his *Manual* in the 2nd edition (1856), made Virginia the southeastern state in the range. When the necessity to rewrite the *Manual* became unescapable I suggested the propriety of extending the northeastern limit to include Newfoundland, where I had prosecuted much field-work. This proposal met with objection because of the great number of additional plants to be considered. A check shows that they total 140 species and varieties. In the brief trips to the southeastern corner of the old manual-range, in Tidewater Virginia, during the six summers up to 1939 (the time in the field totaling 110 days or 3⅔ months) my companions and I have discovered 300 (at this writing fully 400) species new to the *Manual;* and at the present rate of such

discoveries we look forward to 300 more. Nevertheless, Virginia has not been dropped from the manual-range; Newfoundland has won a place in it. But "I digress"; we must return to the narrative.

The Greensville County localities again repaid visits. In the area slightly north of Emporia where *Schwalbea, Seymeria cassioides* and other local species occur, we saw fruits of *Chamaelirium luteum* projecting from the thicket. We had only once before seen it (in Sussex County) on the Coastal Plain. Strickland, making as quick a stop as possible, slowed down on the opposite side of the road—beside a colony of *Hypericum Drummondii*, a species chiefly of the Mississippi basin and the southwestern states, though once before reported from Virginia. At the Dahlia bog *Burmannia* was now mature and very attractive. A baffling series of variations or allies of *Juncus biflorus* forced itself on our attention; *Oxypolis ternata* was now in bloom and *Paspalum praecox* Walt., var. *Curtisianum* (Steud.) Vasey (*P. lentiferum* Lam.) was flowering, our only other Virginia station being in eastern Sussex. When, earlier in the season, we found the rare *Utricularia juncea* here we somewhat painstakingly prepared broad mats of the basal foliage and subterranean stems. Now, where *U. juncea* was flowering in July and August, thousands of freshly flowering needle-like stems of the excessively rare and tiny *U. virgatula* were standing! We do not know to which our mats of foliage belong (probably to both species); but this was only the second Virginian station for *U. virgatula* of Cuba, Florida, eastern Maryland, southern New Jersey and Long Island (MAP 12), the other being on the Eastern Shore.

Proceeding eastward from Skipper's we stopped at a partially overgrown clearing near Taylor's Millpond, there again finding *Hypericum Drummondii;* but the great prize was a fruiting plant of *Lilium carolinianum* (MAP 13), for, although known farther south on the Coastal Plain, *L. carolinianum* is preeminently a plant of the highest mountains (up to 5000 feet) from western Virginia to Alabama. Search failed to show another fruiting specimen (in October plenty of fine fruit was found at the border of dry woods near Skipper's and in June, 1939, we found a gigantic plant of it in Sussex County)[1]. Our last errand was to visit the bottomland of the Meherrin at Haley's Bridge, hoping the Acanthaceous plant which we got there in the spring would at last be in bloom. It certainly was blooming, some colonies

[1] In August, 1939, a fine station found in Prince George County.

with all the flowers cleistogamous, some with a few terminal petaliferous flowers, *Dicliptera brachiata* (Pursh) Spreng., the first colony known so far north as Virginia (except in Missouri).

The October trip (11 to 16) was necessarily a short one (taking advantage of Columbus Day and a long week-end). Mrs. Bowman had found a splendid driver and assistant for us, Leonard Birdsall, a keen young farmer, with previous experience in driving large truck-loads of produce north from Florida and bus-loads of school children through the back roads of Dinwiddie. Leonard at once comprehended what we were about and from his intimate knowledge of the farm-roads was able to take us to many choice spots about which otherwise we should never have known. Seeing how interested we were in the fossiliferous limy areas of Surry, he asked if we had ever visited the colonial marl-pits in Dinwiddie and Prince George. We never had, nor had we imagined lime-deposits near the surface there. When, after driving through circuitous and mystifying back roads, we left the car in dry pineland and walked toward what he assured us were marl-pockets of the early settlers, we wondered; but suddenly the oxylophytes gave way to rich vegetation including the northern red oak (*Quercus rubra* of the manuals) and Leonard led us to the rims of the old pits, covered with colonies of such calcicolous specialties as *Aplectrum hyemale* and *Spiranthes ovalis!* Other such marl-pits, with the marl not visible at the surface, have subsequently been shown us. How the "old fellows" of colonial days knew the lime was there (deep underground) is a problem. Did they recognize the pronounced change in the vegetation?

The flat pineland east of Stony Creek had supplied a meagre but most interesting series of species at every season, beginning in June. We wanted to find an October specialty there; and we certainly succeeded. The open sphagnum-carpeted woods were now given over to a wonderful gentian, in its linear leaves and intense blue "closed" corollas suggesting the northern *G. linearis;* but at once differing in having minutely ciliolate calyx-lobes, jagged pleats as long as the corolla-lobes, and conspicuous dark bands extending from the tube up into the throat. It is a very striking member of the *G. Saponaria* series; best of all, it is an exact match for an isotype, generously presented by Dr. Pennell, of *Dasystephana cherokeensis* W. P. Lemmon, described as a very restricted endemic of the mountains of northwestern Georgia. It has not been found elsewhere, but

flat pineland of the Coastal Plain of Virginia, at least 400 miles northeast of the type-region of *Gentiana cherokeensis*,[1] is also very different terrain. Here is another addition (MAP 14) to the very considerable list, already reported, of this striking geographic segregation. The specific name was given, to use its author's words, because the species is "apparently restricted to the territory anciently occupied by the Cherokee Indians". Now, however, the "Cherokee Gentian" is likewise known in the ancient land of the Powhatan!

Gentiana cherokeensis was not the only discovery in the genus. In 1936 we found the slender plant, known as *G. Porphyrio*, in the border of pine woods south of Factory Hill. At that time we labeled and reported it as from Nansemond County, Virginia. Subsequently, fearing that the colony was probably a few rods over the line, in Gates County, North Carolina, we went to unscramble the confusion we had made. On the way, *north* of Factory Hill (most definitely in Virginia) we found a splendid group of the species and when we got to our old station, as definitely in North Carolina, we found *Aster spectabilis*, var. *suffultus* Fernald, a supposed eastern Virginian endemic, growing with it (of course new to North Carolina). But to return to *Gentiana Porphyrio* (name from the purple of porphyry), the name was given by J. F. Gmelin as a substitute for *G. purpurea* Walter, not L. Walter's diagnosis called for a bright purple infundibuliform corolla; while the plant erroneously called *G. Porphyrio* has an intense azure or indigo corolla with rotate limb. It certainly is not what Walter had; incidentally it must have a new name (see Part II). Best of all, at the border of the bottomland of the Meherrin and again in a peaty clearing in pineland near Branchville we did find a gentian with infundibuliform purple corollas. It is a rare plant but there is a sheet of it in the Gray Herbarium from Beaufort County at the southeastern corner of South Carolina (Walter's country). In it we at last doubtless have real *Gentiana Porphyrio!*

Throughout the summer we had sought in vain for *Drosera brevifolia;* from late June to September it had been invisible. Now, after heavy autumnal rains and the waning of the summer heat, with the welcome cool nights, peaty depressions suddenly became covered with brilliant new rosettes of the *Drosera*. Spots in Nansemond and in Dinwiddie, where we had thoroughly inspected the ground earlier in

[1] GENTIANA **cherokeensis** (W. P. Lemmon), comb. nov. *Dasystephana cherokeensis* W. P. Lemmon in Bartonia, no. 17: 4 (1935).

the season were now vivid with the small foliage; again an instance showing that negative evidence must be used with caution. And, whereas we had come to think of a single bog as the home of *Burmannia biflora*, we now found it somewhat farther north, and, in following a mossy woodroad more than 25 miles to the east, in Southampton County, we came upon a solitary stray individual. Its source in the latter county is not yet located.

After the scientific meetings at Richmond, where, in conversation, doubt was raised by Dr. Roland Harper as to the exact status of *Pinus palustris* (Long-leaf Pine) in Virginia, Long and I induced Mr. and Mrs. Donovan S. Correll to drive with us to Harper's supposed station (seen from a train). December 31st was spent in wading in ice-water, for fruit of the various gentians of the bogs and flat pinelands. On New Years Day Long and I started to exhibit some of our choice habitats. Slowing down at our old parking-spot in the pine barrens south of Zuni, we were startled and grieved to hear Mrs. Correll announce: "Why, there's Long-leaf Pine right there!" And there it was! Intent on *Carphephorus*, *Polygonella polygama*, *Pyxidanthera*, *Juncus abortivus* and the other pine-barren herbs and low shrubs new to Virginia, we had half-a-dozen times brushed by the great columnar young pines without their "registering". Not only young columns were there; plenty of old fruiting trees occur. We have not yet got over our chagrin, for we promptly remembered Long-leaf Pine south of Cleopus in Nansemond County; we later collected it from specimens we had several times jostled in passing, south of Franklin in Southampton County; and in western Nansemond (near the Blackwater) we now have an area where it and *Chamaecyparis* are rapidly coming back after intensive cutting. Long and I can't jeer each other by mentioning Long-leaf Pine; that score is even! The mention of it simply makes us sad and humble.

The April recess, 1939, found us at Petersburg and Leonard on hand to help us (4th–9th). We knew that in early spring the rich woods and ravines would be most productive, fallow fields next, pinelands and bogs without much, unless we could reinstate *Bartonia verna* in the flora of the state. Consequently we started for the rich calcareous woods toward the James. *Ranunculus micranthus* at once absorbed our interest. The little plant we know farther north has opaque and villous foliage, the unlobed radical leaves subtruncate to subcuneate at base. The plant of southeastern Virginia is lustrous-

green, with nearly glabrous unlobed basal leaves rounded to cordate at base, the plants relatively coarse and growing in deep calcareous woodland loam, instead of in thin films of soil about ledges. The southern plant matches Nuttall's type from Arkansas; the situation will be further discussed in Part II. *Aplectrum* was more frequent than we had ever seen it; in one piece of rich woods the rare and very early *Corallorhiza Wisteriana*, new to Virginia, was flowering; and on calcareous springy bottomlands *Cardamine Douglassii*, previously only a name to us, abounded, its purple to pinkish-white flowers decidedly earlier than the white flowers of *C. bulbosa*. *Nemophila microcalyx* proved to be common in rich woods, but *Phacelia dubia* has adopted bad practices; it is one of the regular early-spring weeds of fallow fields. Another weed, this time of lawns and grassland in the southernmost counties of Greensville and Southampton, is *Stellaria prostrata* Baldw. (*Alsine Baldwinii* Small), stated by Small to occur from "Fla. to Tex. and Ga." The residents of Emporia, Courtland and Franklin wish it would stay there. It forms dense, closely prostrate yellowish-green mats in the lawns, the slender fruiting calices upon maturity promptly disarticulating, leaving the naked pedicels. We were enthusiastically ridding the lawn at the courthouse in Courtland of this plant, "first north of Georgia," when a passing resident saw us and said: "What? You interested in that? Come over to my house and you can have a bushel of it. I won't charge you a cent, either!" We got plenty of it where we were and we did not take it all.

Another Caryophyll which greatly interested us was *Cerastium brachypodum:* "St. Louis, Mo. . . . to the Black Hills, S. Dakota . . . , westward and southward to Nevada, . . . Arizona, . . . New Mexico . . . and Louisiana" (*Robinson*, Synopt. Fl.); "Ga. to Tex., Ariz., S. D. and Ill." (*Small*). It grows at the margin of bottomland woods along Cattail Creek south of Burgess (Dinwiddie County). The plowing of a neighboring field has disturbed it, but it has not spread, like the aggressive *C. viscosum*, into the cultivated area. It looks like a case of the plow intruding upon it. At any rate, it is another first colony known north of Georgia.

In May (18th to 23rd) all the bushy clearings were golden with *Arnica acaulis* or *Senecio Smallii*. In shallow depressions the evasive *Drosera brevifolia* was beautifully flowering, the rotate corolla large for the genus, white and well over a centimeter broad; but one had to

be on hand in the forenoon to see it; its flowers close promptly at noon. At our old stations (reported a year ago) *Phlox carolina* L., var. *triflora* (Michx.) Wherry was flowering, and at a new station the hundreds of plants made the damp woods brilliant. It does not stop at 3 flowers; some of our specimens show ten times that number in a single corymb. In some fallow fields *Muscari racemosa* ("Bluebottle") was an abundant and obnoxious foul-smelling weed, while extreme large-flowered *Linaria canadensis*, var. *texana* (Scheele) Pennell, new to Virginia, could be traced by series of transitions into the ordinary small-flowered plant. *Specularia biflora*, known from Virginia only through a single old collection, was a regular occupant of many old fields, but we had great difficulty in finding petaliferous flowers; they were mostly cleistogamous. In one old fallow field near Skipper's, where the colored owner greatly enjoyed and encouraged our extermination of weeds, the lower plowed margin merges into an exsiccated argillaceous pond-hole. Here we crawled on hands-and-knees, to the edification of our host, scraping up films of fruiting *Callitriche deflexa*, var. *Austini* (which Griscom and I got for the first time in Virginia in Norfolk County), and collecting gigantic specimens of *Alopecurus carolinianus*, *Agrostis Elliottiana* (new to Virginia), *Sagina decumbens* and *Viola lanceolata*, var. *vittata* (the largest plant well covering an herbarium-sheet). A few plants of *Juncus secundus*, new to Virginia, were here, but they seemed rather discouraged.

While on the ruderal and weedy types, two species of *Cerastium*, found in Southampton County, should be mentioned. Stopping south of Franklin at the margin of the swampy woods bordering the pine barrens toward Smith's Ferry (really to renew the vain search for the still too shy *Bartonia verna*, but incidentally picking up *Carex Walteriana*, var. *brevis*, *Amianthium Muscaetoxicum* and *Kalmia angustifolia*, var. *caroliniana*) we slowed down on the soft shoulder. Stepping out, we found ourselves in a colony of a very strange roadside *Cerastium*. An annual, with very dichotomous inflorescences, its bracts end in long tufts of hairs. It proves to be the comparatively rare European *C. brachypetalum* Desportes, new to North America. Still another *Cerastium* new to North America abounds along the basement of a warehouse in Courtland. It immediately attracted our attention by its nearly glabrous stems and blue-green, blunt, elliptic leaves. It is *C. vulgatum*, var. *holosteoides* Fries. Just why Courtland, on the Southern Railroad, should be so rich a center for unusual

ruderal species we do not know. It is almost as good for a "peppy half-hour" as the region of the Norfolk & Western in Petersburg, and the weed-population of the two roads, both starting out of Norfolk, is different.

Now to the undisturbed habitats. The sphagnous bog northwest of Dahlia naturally won our prompt attention. There the most obvious sedge at this season was typical pubescent-fruited *Carex venusta*, known to Mackenzie (N. Am. Fl.) only from Florida to North Carolina. When we first collected it we took it to be var. *minor* (with glabrous fruits), which was now common in most sphagnous areas. Mackenzie treats the two as distinct species, in contrast to Francis Boott, Boeckeler, Bailey, Kükenthal and others who see only pubescent- and glabrous-fruited varieties. Our failure to see any difference until we got home and turned a lens on the Dahlia plant is significant! *Zigadenus angustifolius*, of which a single old fruiting scape was found the preceding July, was flowering but very scarce, only a few plants, in danger of intrusion by the plow. The plow, most unfortunately, had turned a strip about 20 feet wide on the upper edge of the bog, coming altogether too near some of the specialties. Later in the season, in June and July, it was evident that the farmer had found the land useless, very sour and wet, and the plowed strip is now an almost solid garden of *Lachnocaulon!* That at least survives; but a few more slices taken off the bog will finish *Burmannia biflora*, *Oxypolis ternata*, *Zigadenus angustifolius* and most of the other choice rarities.

During our somewhat hectic discovery in the autumn of 1938 of station after station for the new *Coreopsis oniscicarpa* Fernald in Rhodora, xl. 472, pl. 533 and 534 (1938), we had found a particularly nice colony along a seepy woodroad north of Dahlia. Thinking something else might be in so good a spot, we followed the woodroad; and there, in May, in the identical area where in October the orange-rayed and purple-black-centered *Coreopsis* abounded, we gazed upon a slender Composite with golden rays and dark center. Assuring each other that we were "all right" and not "seeing things," we discussed the phenomenon of the vernal flowering of autumnal species and particularly of the new *Coreopsis oniscicarpa*. Then, thinking it important to collect vernal specimens, we knelt in the colony. It wasn't *Coreopsis* at all, but the southern pineland *Helenium brevifolium* (Nutt.) Gray, new to Virginia! Even the rosettes of spatulate to linear-oblanceolate basal leaves are so like those of the *Coreopsis* that one has to look thrice to distinguish them.

At this season it seemed worth while to visit the old marl-pits east of Burgess Station. In May the area was a veritable garden, though the most significant plants were, paradoxically, relatively insignificant! The dominant *Carex* was *C. oxylepis*, little known in Virginia, forming great stools and very distinct in appearance, one of the few pilose-leaved species. *C. amphibola* Steud., new to Virginia, was with it and, of course, the ubiquitous *C. flaccosperma* which we once thought rare; and with them the very tall *Eleocharis tenuis*, var. *pseudoptera* (Weath.) Svenson, which had been known in Virginia only along the Potomac. And here, at last, on the rim of one of the old pits, where in October *Spiranthes ovalis* flowers, was the vernal calcicolous *Ophioglossum* in mature fruit. For some years we had been puzzled by the *Ophioglossum* which on the Coastal Plain of Virginia occurs in limy pockets and rich alluvium, with firm and highly lustrous sterile fronds, found from early April into May. Now, after repeatedly collecting it a little too young, we finally had good fruit. This collection forms the type of the southern variety to be described and illustrated in Part II.

One other day, the last to be here noted, we specialized upon two peculiar plants. In 1938 I reported (Rhodora, xl. 376, 381, 382 and 396) the discovery of a single area, about calcareous springheads in Surry County, of the little known *Scirpus fontinalis* Harper (map 15), a species otherwise known only about similar calcareous springheads in Georgia. Now, in May, we were delighted to find that it characterized probably all wooded springheads and bottomland woods in the area of exposed Miocene fossil-beds from Prince George southeastward through Surry. Our westernmost station is along Wall Creek in northern Prince George, our easternmost along College Run in northeastern Surry. Presumably it extends farther northeast and southwest. The very full series now at hand, in all stages from earliest flowering to dropping fruit, shows that, while the Virginia plant has all the crucial characters (narrow scales, long-beaked achenes, etc.) of the Georgian type, it consistently departs from it in the habit of the inflorescence. In Part II I shall set it off as a new variety. Occupying the same habitats and seen only there (or in rich calcareous woodland on Coggins Point) there was a giant *Myosotis*, with minute white flowers and very large fruiting-calyx. It was wholly new to us and its season is quickly over. On every calcareous bottomland, which we visited, it abounds. It must be highly

selective in its choice of habitats, for its glochidiate-bristly calices promptly drop off or catch on every passing trouser-leg. Yet it stays conservatively in the calcareous woods and on the bottomlands of creeks. It proves to be real *M. macrosperma* Engelm., previously represented in the Gray Herbarium only from Texas, Arkansas and southern Missouri. It and the Georgian *Scirpus fontinalis*, which shares with it the Miocene fossil-beds of southeastern Virginia, are appropriate species with which to close this section of the paper.

Many other significant species enumerated in Part II are here omitted for want of space. Furthermore, although it is a temptation to tell something of the 94 species new to Virginia discovered on trips in June and July, 1939, those, like many of earlier date, need more study; incidentally, field-work since May, when the special fund for Phytogeographic Research became exhausted, has been supported by a grant from the American Philosophical Society. This more recent work will form the basis for a later report.

Part II. Enumeration and Discussion of Noteworthy Species Collected

The following notes follow the plan of preceding papers, of recording such species and stations as seem to be significant in working out a fuller knowledge of the flora of the state and omitting the generally common species. Although primarily a record of collections made from July, 1938 through May, 1939, note is made of a few earlier and later collections when these are important in the presentation. The cost of field-work was defrayed through a Fund for Phytogeographic Research most generously given for the purpose by a friend of the Gray Herbarium. The cost of preparation of the plates by my assistant, Walter H. Hodge, has been met through an appropriation for personal research from the Division of Biology of Harvard University. The large expense of reproducing the photographs and the cost of extra paging has been most kindly defrayed by my companion on the trips and the actual discoverer of many of the rarities, Bayard Long. In case of our own collections it seems unnecessary to repeat the names of the collectors, *Fernald & Long*, except in the more critical discussions. As in previous notes plants thought to be new to the flora of Virginia are indicated by an asterisk (*). Many technical species collected await further study before they can be reported upon. Some of them will be discussed in later papers.

DRYOPTERIS CELSA (Wm. Palmer) Small. To the localities already noted add from SURRY COUNTY: very abundant in rich deciduous woods 1½ miles east of Blizzard's Corners, no. 9235.

ASPLENIUM PLATYNEURON (L.) Oakes, var. BACCULUM-RUBRUM (Featherman) Fernald. Our northernmost station is in JAMES CITY COUNTY: rich woods south of Hotwater, no. 8531.

DENNSTAEDTIA PUNCTILOBULA (Michx.) Moore. To the single Coastal Plain station previously reported in Surry County add from HENRICO COUNTY: dry oak woods and clearings bordering Whiteoak Swamp, west of Elko Station, no. 9236. SUSSEX COUNTY: on base of large tree, wooded bottomland of Jones Hole Swamp, west of Coddyshore, no. 10,068.

*OPHIOGLOSSUM VULGATUM L., var. **pycnostichum**, var. nov. (TAB. 570). Planta 1–3 dm. alta viridis; caule commune 4.5–13 cm. longo basi valde vaginato, vagina coriacea brunnea 3–7 mm. longa; lamina rotundo-ovata vel anguste ovata vel late lanceolata basi plerumque rotundata crassa lucida 2.5–8.5 cm. longa 1–4 cm. lata; sporangiis valde compressis transverse oblongis.—Rich calcareous woodlands, Maryland and District of Columbia to North Carolina and northern Indiana. MARYLAND: Woodside, Montgomery County, June 13, 1897 (overripe), *C. L. Pollard.* DISTRICT OF COLUMBIA: in ravines near Dupont Heights, July 22, 1905, *Tidestrom.* VIRGINIA: James City County: rich heavy soil in mixed woods, near Capitol Landing, 1½ miles northwest of Williamsburg, April 19, 1921 (nearly mature), *E. J. Grimes*, no. 3444. Surry County: wooded swamp east of Spring Grove, April 7, 1939 (immature), *Fernald & Long*, no. 9696. Prince George County: low deciduous woods about 1 mile northwest of Disputanta, April 6, 1938 (immature), *Fernald & Long*, no. 7744. Dinwiddie County: rich deciduous woods about old marl-pits east of Burgess Station, May 18 and 19, 1939 (mature), *Fernald & Long*, no. 9796 (TYPE in Herb. Gray, ISOTYPE in Herb. Phil. Acad.). Sussex County: alluvial woods, Nottoway River, northeast of Lumberton, April 3, 1938 (immature), *Fernald & Long*, no. 7741. Southampton County: rich woods, Violet Hill, near Devil's Elbow, June 23, 1936 (overripe), *Fernald, Long & Smart*, no. 5587; rich loamy wooded slope near Hart's Bridge, southwest of Sunbeam, April 4, 1938 (immature), *Fernald & Long*, no. 7742; wooded bottomland of Blackwater River, southeast of Ivor, July 19, 1939, *Fernald & Long*, no. 10,471 (all sterile). Greensville County: bottomland woods by Metcalf Branch, east of Emporia, April 8, 1938 (nearly mature), *Fernald & Long*, no. 7743. NORTH CAROLINA: moist open woods near Windsor, Bertie County, April 11, 1932 (immature), *E. J. Palmer*, no. 39,797. OHIO: Clermont County, May, 1873 (overripe, sporangia all dehisced), herb. *Chas. E. Faxon.* INDIANA: "with sugar maple, sedge [red?] ash and *Botrychium obliquum*," Lowry's woods, Marshall County, May 26, 1933 (mature), *R. M. Kriebel*, no. 176. See p. 492.

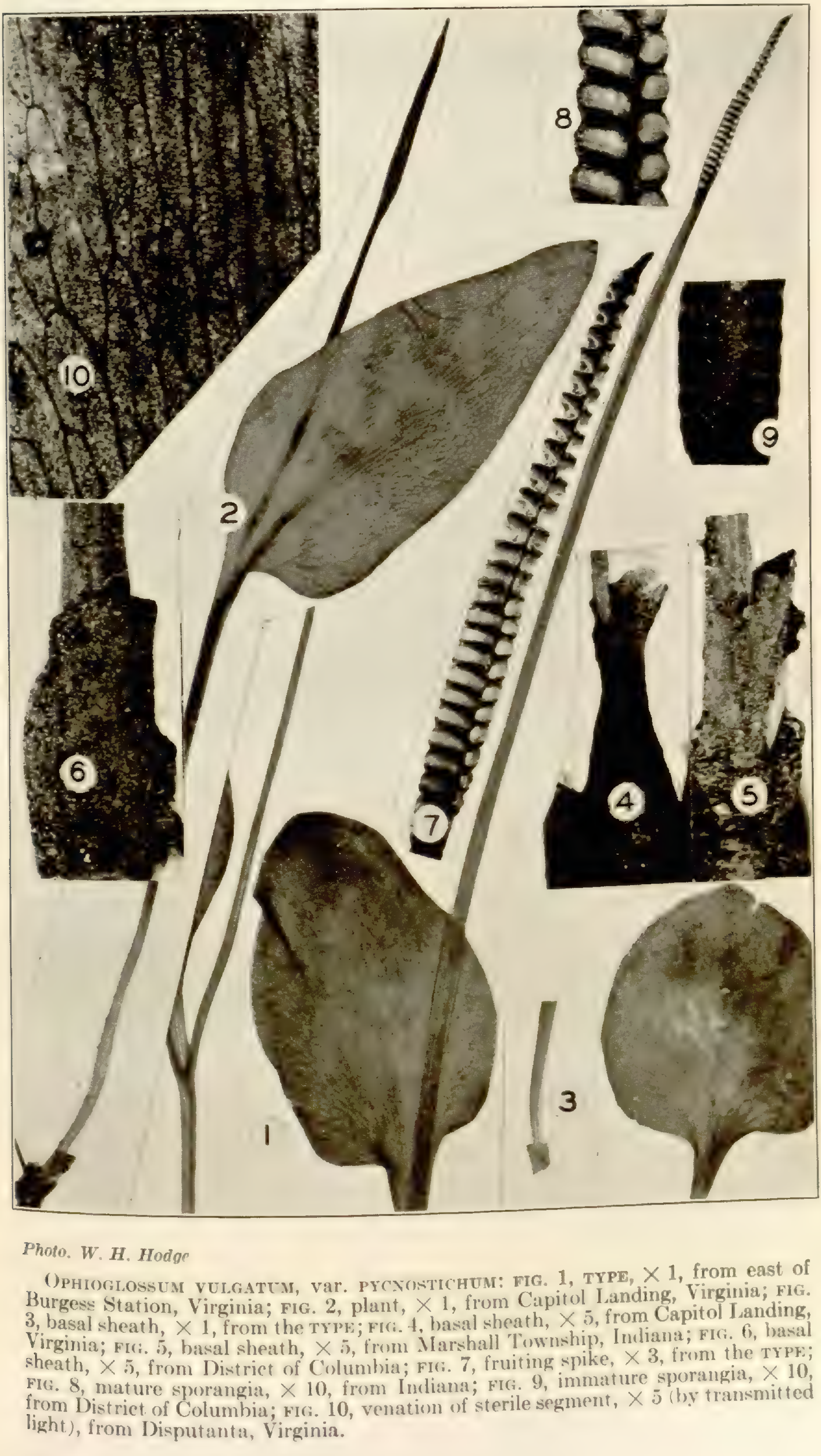


Photo. W. H. Hodge

OPHIOGLOSSUM VULGATUM, var. PYCNOSTICHUM: FIG. 1, TYPE, × 1, from east of Burgess Station, Virginia; FIG. 2, plant, × 1, from Capitol Landing, Virginia; FIG. 3, basal sheath, × 1, from the TYPE; FIG. 4, basal sheath, × 5, from Capitol Landing, Virginia; FIG. 5, basal sheath, × 5, from Marshall Township, Indiana; FIG. 6, basal sheath, × 5, from District of Columbia; FIG. 7, fruiting spike, × 3, from the TYPE; FIG. 8, mature sporangia, × 10, from Indiana; FIG. 9, immature sporangia, × 10, from District of Columbia; FIG. 10, venation of sterile segment, × 5 (by transmitted light), from Disputanta, Virginia.

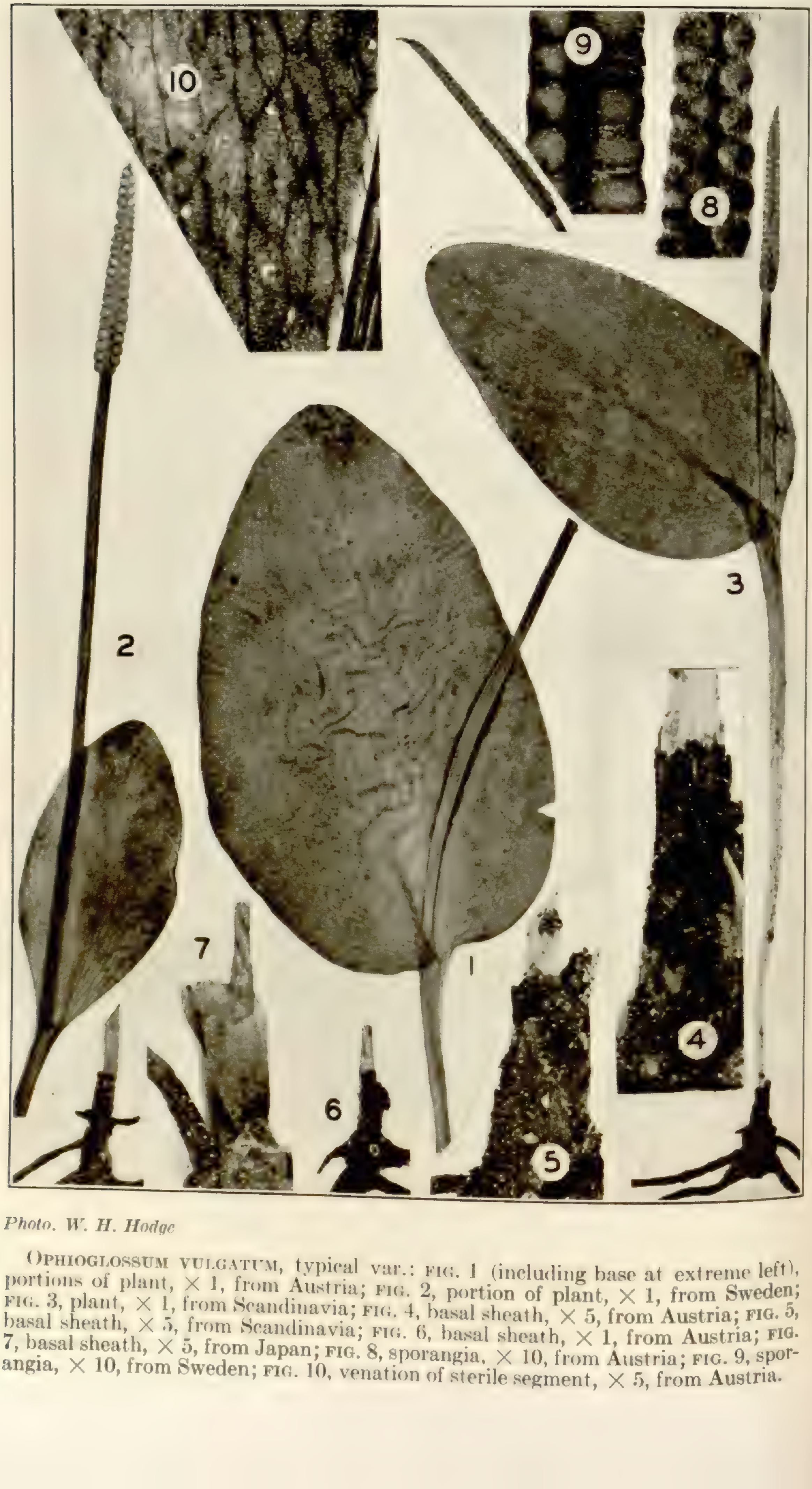


Photo. W. H. Hodge

OPHIOGLOSSUM VULGATUM, typical var.: FIG. 1 (including base at extreme left), portions of plant, × 1, from Austria; FIG. 2, portion of plant, × 1, from Sweden; FIG. 3, plant, × 1, from Scandinavia; FIG. 4, basal sheath, × 5, from Austria; FIG. 5, basal sheath, × 5, from Scandinavia; FIG. 6, basal sheath, × 1, from Austria; FIG. 7, basal sheath, × 5, from Japan; FIG. 8, sporangia, × 10, from Austria; FIG. 9, sporangia, × 10, from Sweden; FIG. 10, venation of sterile segment, × 5, from Austria.

The plant of calcareous rich woodlands of southeastern Virginia (to be looked for in all the Miocene marl-beds) is very unlike the plant of northern peaty meadows, wet sands and drier acid soils which erroneously passes in North America as typical *Ophioglossum vulgatum*. So impressed were we by the very early (April to June) development of the plant, its calcareous habitat, its dark-green, lustrous, mostly ovate sterile fronds, its transversely oblong crowded sporangia (FIGS. 7–9) and the persistent brown basal sheaths (FIGS. 2–6), that I turned with confidence for clarification to Dr. Clausen's Monograph.[1] There, however, only disappointment was met; Clausen sees nothing of importance in the varieties proposed within *O. vulgatum*, lumping them all, whether from Eurasia, the acid bogs, swales and sands of Canada and the Northern States, the calcareous woodlands of the Southern and Central States, or Mexico or Africa as one plant quite unworthy of any geographic segregation. Even the very definite *O. vulgatum*, var. *alaskanum* (E. G. Britton) C. Christensen, which is maintained not only by Christensen but by Hultén, who is likewise familiar with typical European *O. vulgatum*, is reduced outright by Clausen; and many other proposed species and varieties are swept into one undifferentiated mass. This easy and over-conservative viewpoint, which will not be indorsed by those who intimately know the plants in the field but by which troublesome old names are uncritically disregarded, is expressed as follows: "Various trivial forms and varieties, based largely upon size of plant and shape of sterile blade, have been described, but since they seem to represent normal variations of any local population of this species, they are not considered in this discussion" (Clausen, p. 124).

Typical Eurasian *Ophioglossum vulgatum* (PL. 571) seems not to occur in America. In some characters it is approached by var. *alaskanum*, in others by the plant of southern Canada and the Northern States, in others by the calcicolous var. *pycnostichum*. True *O. vulgatum* has a definite chartaceous or coriaceous sheath (FIGS. 1 and 3–7) surrounding the common stalk; its sterile frond is most often ovate or oval, with commonly rounded base, and described as pale- or yellowish-green and opaque; and its sporangia (FIGS. 8 and 9) are in outline suborbicular to quite round. It is well illustrated in many European plates, those which show the rhizome also picturing the

[1] Robert T. Clausen, *Monograph of the Ophioglossaceae*, Mem. Torr. Bot. Cl. xix. no. 2 (1938).

sheath surrounding the common stalk. See, for example, Smith & Sowerby, Engl. Bot. ii. t. 108 (1793); Syme, Engl. Bot. xii. t. 1835 (1886), where the description is perfectly clear: "the frond, with its base enveloped in an olive-brown stipule-like sheath"; and J. Britten, Europ. Ferns, opp. p. 185 (1880–82).

The common plant (PL. 572) of acid or subacid soils (often boggy meadows, swales or damp sands, but sometimes dry and more exposed habitats) from eastern Canada to Washington and rather generally in the Northern States has the common stalk naked at base (FIGS. 1 and 2, and 4–7), the pale and opaque sterile frond oblanceolate, narrowly obovate, elliptic or lanceolate, and usually tapering gradually to base. In these characters it is unlike most Eurasian plants (with basal sheath and usually more ovate frond rounded at base); but the plant of Canada and the Northern States has the suborbicular sporangia (FIGS. 8–10) much as in typical Eurasian *O. vulgatum*. It is beautifully shown in D. C. Eaton, Ferns N. Am. ii. t. lxxxi, figs. 1–4 (1880). The earliest name for our common oxylophytic plant with sheathless fronds is *O. pusillum* Raf. in Desv. Journ. Bot. sér. 2. iv. 273 (1814) (apparently overlooked by Clausen), described

> "41. *Ophioglossum pusillum;* feuille glabre, lancéolée aiguë, petiolée; épi plus long que la feuille. *Pensylvanie* (deux à trois pouces.)"

At the same time Rafinesque published

> "40. *Ophioglossum pubescens;* feuille pubescente. N. *Jersey.*"

What the latter is I leave to New Jersey botanists; Clausen, who has been much in New Jersey, failed to clarify it (see his p. 164). But Rafinesque's *O. pusillum*, antedating (and therefore invalidating) *O. pusillum* Nutt. (1818), is also *O. Grayi* Beck, Bot. No. and Mid. U. S. 458 (1833) (name overlooked by Clausen). That, however, was a provisional name only and, therefore, invalid; incidentally it was inadequately described and only vaguely typified: "Dr. Gray has found 2 or 3 specimens of a fern which resembles this [the Nova Scotian *O. vulgatum*] in its specific characters, but is scarcely 2 inches high. It may prove on further examination to be a distinct species. If so, I would propose for it the name of *O. Grayi.*"

As stated, a provisional name, like *Ophioglossum Grayi*, is illegitimate. Incidentally the description and typification are inadequate; and it is established by the data in the Gray Herbarium that the dwarf specimens referred to were sent to Gray from Exeter, Otsego

County, New York, by Dr. Curtis.[1] The name *O. Grayi* is wisely discarded. The dwarf specimens which Dr. Gray had and which he supplied to Beck are of the small extreme later properly described and illustrated as *O. arenarium* E. G. Britton in Bull. Torr. Bot. Cl. xxiv. 555, tt. 318 and 319, fig. 3 (1897). That this is only the most dwarfed extreme of our northern plant is now usually conceded. In 1911 slightly larger individuals from a swamp in Delaware County, Pennsylvania, with the sterile frond prolonged into a linear base, were described as *O. vulgatum,* var. *lanceolatum* Clute in Fern. Bull. xix. 72 (1911). This material is an extreme of the northern plant, but the name can not be maintained because of *O. vulgatum,* var. *lanceolatum* Luerss. (1878), an Australian plant which is included in *O. Prantlii*

[1] In ed. 1 of his Manual, 636 (1848), under *O. vulgatum,* Gray said: "A few immature specimens of a remarkably dwarf state, 1′–2′ high, with the young spike almost sessile, were gathered by Dr. Curtis, in Otsego county, New York." Somewhat earlier, thinking it a new species, he had given some to Beck and more of it to Torrey, with the suggestion that it was distinct from *O. vulgatum.* The following excerpt from Mrs. Britton's *Revision of the North American Species of Ophioglossum* (Bull. Torr. Bot. Cl. xxiv., especially pp. 546, 547 (1897)) is explanatory.

"In the Torrey Herbarium, unnamed, there is a sheet with six small immature specimens, two bearing fertile spikes and the following note by Dr. Gray:

Ophioglossum n. sp. I send you ½ I have and probably shall not be able to procure any more very soon. 15 to 20 specimens were found on a dry hill at Exeter (Otsego Co.) 12 of them in fruit. A few specimens are in the hands of a friend who first noticed it, Dr. Hadley has a specimen and I sent some to Beck 2 years ago (the same summer it was discovered). He has never given an opinion or said a word about it. I do not know that *O. vulgatum* or any other species has been found in this section. It appears to come near *O. pusillum* Nutt. but that species has 'frond cordate acute'—this has the frond *acute at the base* and obtuse at the extremity. These specimens are as large as any that have been found.

If you think it new suppose you publish it.

A. G."

Gray, it is obvious, was not at first and in his youthful inexperience content to place the plant of Otsego County with the Eurasian *Ophioglossum vulgatum,* a view in which he was entirely right! Still earlier Thomas Nuttall had expressed doubt about the identity of our plant with the European, in his Genera of North American Plants, ii. 248 (1818) describing his new *O. pusillum* and admitting a second species: "*O. vulgatum?* Frond oblong-ovate, obtuse, closely reticulated. Probably distinct from the European species." This healthy skepticism was soon overwhelmed by the weight of "authority" and, instead of seeing the actual differences, most later botanists have been content to overlook them, again illustrating the truth, that in critical taxonomic study inert ultraconservatism may be as misleading as alert radicalism!

C. Chr. (1906). Dr. S. F. Blake, without noting the fundamental characters which separate the American from the Eurasian plants of *O. vulgatum,* defined two leaf-forms of the former: forma *lanceolatum,* based on Clute's var. *lanceolatum* (already noted) and forma *pseudopodum* Blake in RHODORA, XV. 87, fig. 1 (1913), typified by a collection from New Hampshire with unusually prolonged sterile frond. This was later raised to varietal rank as *O. vulgatum,* var. *pseudopodum* (Blake) Farwell in Rep. Mich. Acad. Sci. xviii. 84 (1916). As the earliest varietal name var. *pseudopodum* seems to be the proper one for the commonest American variety.

Returning to var. *pycnostichum* (PL. 570), in outline of sterile frond and in its persistent basal sheath it strongly suggests typical Eurasian *O. vulgatum;* but it is quickly distinguished by its firm, dark-green and lustrous fronds and especially by the crowded and transversely oblong sporangia (FIGS. 1 and 7–9). In the latter characters it stands far apart from the others.

My interpretation of the North American varieties of *Ophioglossum vulgatum* may be summarized as follows.

[O. VULGATUM L. Sp. Pl. ii. 1062 (1753). Common stalk surrounded at base by a brownish chartaceous or coriaceous sheath; sterile frond usually ovate or oval, with rounded base, yellowish-green, opaque; sporangia suborbicular or round in outline.—Eurasia. PLATE 571.]

Var. ALASKANUM (E. G. Britton) C. Chr. in Hultén, Kungl. Sv. Vet. Akad. Handl. v. no. 1 (Fl. Kamtch.), 45 (1927). *O. alaskanum* E. G. Britton in Bull. Torr. Bot. Cl. xxiv. 556, t. 319, fig. 5 (1897). Sterile frond thin, translucent, ovate, rounded at base, the venation very evident, recalling that of *O. reticulatum;* sporangia round.—Alaska and Kamtchatka.

Var. PYCNOSTICHUM Fernald, supra. Common stalk surrounded at base by a brownish firm sheath; sterile frond round- to narrow-ovate or broadly lanceolate, mostly rounded at base, dark-green, firm, lustrous; sporangia crowded, transversely oblong.—Rich, chiefly calcareous woods, Maryland to North Carolina and southern Indiana. Fruiting from May to July. PLATE 570.

Presumably some of the specimens cited by Clausen from the southern part of the range belong here.

Var. PSEUDOPODUM (Blake) Farwell in Rep. Mich. Acad. Sci. xviii. 84 (1916). Forma *pseudopodum* Blake in RHODORA XV. 87, fig. 1 (1913). *O. pusillum* Raf. in Desv. Journ. Bot. sér. 2, iv. 273 (1814). *O. Grayi* Beck, Bot. No. and Mid. U. S. 458 (1833), provisional (invalid) name. *O. arenarium* E. G. Britton in Bull. Torr. Bot. Cl. xxiv. 556, t. 318 and t. 319, fig. 3 (1897). *O. vulgatum,* forma *arenarium* (E. G. Britton)

Clute, Our Ferns in their Haunts, 47, 316 (1901). *O. vulgatum*, var. *lanceolatum* Clute in Fern Bull. xix. 72 (1911) not Luerss. (1878). *O. vulgatum*, forma *lanceolatum* (Clute) Blake in RHODORA, XV. 87 (1913). *O. vulgatum*, forma *pusillum* (Raf.) House in Bull. N. Y. State Mus. cclxiii-cclxiv. 42 (1923).—Peaty or grassy swales, wet thickets and shores, damp sands, sterile pastures, etc., Quebec to Washington, south at least to Delaware, Pennsylvania, Ohio, Indiana, Illinois, Nebraska, Arizona and Mexico (the latter with the undescribed synonym *O. Pringlei* Underwood ex Clausen, l. c. 125 (1938) in synonymy). Fruiting from late May to August. PLATE 572.

The smaller plants have been erroneously referred to var. *minus* Moore of Europe.

EXPLANATION OF PLATES 570–572

PLATE 570. OPHIOGLOSSUM VULGATUM L., VAR. PYCNOSTICHUM Fernald: FIG. 1, TYPE, × 1, from east of Burgess Station, Virginia, *Fernald & Long*, no. 9796; FIG. 2, plant, × 1, from Capitol Landing, Virginia, *Grimes*, no. 3444; FIG. 3, basal sheath, × 1, from the TYPE; FIG. 4, basal sheath, × 5, from *Grimes*, no. 3444; FIG. 5, basal sheath, × 5, from Marshall Township, Indiana, *Kriebel*, no. 176; FIG. 6, basal sheath, × 5, from Dupont Heights, District of Columbia, July 22, 1905, *Tidestrom;* FIG. 7, fruiting spike, × 3, from the TYPE; FIG. 8, mature sporangia, × 10, from *Kriebel*, no. 176; FIG. 9, immature sporangia, × 10, from *Tidestrom;* FIG. 10, venation of sterile segment, × 5, from Disputanta, Virginia, *Fernald & Long*, no. 7744.

PLATE 571. OPHIOGLOSSUM VULGATUM (typical): FIG. 1 (including base at extreme left), portions of plant, × 1, from near Vienna, Austria, June 12, 1895, *Dörfler;* FIG. 2, plant, × 1, from Grönskär, Södermanland, Sweden, July 17, 1927, *Asplund;* FIG. 3, plant, × 1, from Scandinavia, June 27, 1882, *Tharsson;* FIG. 4, basal sheath, × 5, from Vienna specimen, *Dörfler;* FIG. 5, basal sheath, × 5, from Scandinavian plant, *Tharsson;* FIG. 6, basal sheath, × 1, from Vienna plant, *Dörfler;* FIG. 7, basal sheath, × 5, from Todahara, Mushashi, Japan, May 24, 1891, *Watanabe;* FIG. 8, sporangia, × 10, from Vienna plant, *Dörfler;* FIG. 9, sporangia, × 10, from Swedish plant, *Asplund;* FIG. 10, venation of sterile segment, × 5, from same plant as FIG. 1.

PLATE 572. OPHIOGLOSSUM VULGATUM, VAR. PSEUDOPODUM (Blake) Farwell: FIG. 1, plant, × 1, from Dixville Notch, New Hampshire, July 27, 1906, *E. F. Williams;* FIG. 2, plant, × 1, from Cedar Lake, Nova Scotia, *Fernald, Bean & White*, no. 19,483; FIG. 3, ISOTYPE, × 1, of *O. vulgatum*, forma *pseudopodum* Blake; FIG. 4, base of common stalk, × 5, from Nova Scotia, no. 19,483; FIG. 5, base of common stalk, × 5, from Dixville Notch, New Hampshire, *Williams;* FIG. 6, base of common stalk, × 1, from Willoughby, Vermont, July 21, 1896, *Kennedy;* FIG. 7, base of common stalk, × 5, from same collection as fig. 6; FIG. 8, sporangia, × 10, from the Nova Scotian plant, no. 19,483; FIG. 9, sporangia, × 10, from the Willoughby plant; FIG. 10, sporangia, × 10, from ISOTYPE of *O. vulgatum*, forma *pseudopodum* Blake.

PINUS PALUSTRIS Mill. Local. NANSEMOND COUNTY: white sand of pine barrens southwest of South Quay, no. 10,084; also seen in white sand, south of Cleopus. ISLE OF WIGHT COUNTY: open white sand in dry pine barrens, south of Zuni, *Fernald, Long & Correll*, no. 9676. SOUTHAMPTON COUNTY: dry sandy open pine and oak woods 6 to 7 miles south of Franklin, no. 9798.

At the Zuni station and below South Quay numerous old and fruiting trees as well as seedlings; at the other stations mostly young trees. See p. 488.

CHAMAECYPARIS THYOIDES (L.) BSP. SOUTHAMPTON COUNTY: several large trees in wooded swamp about 7 miles south of Franklin, no. 8535. See p. 469. NANSEMOND COUNTY: many large fruiting trees and seedlings in wet wooded depression in pine barrens east of Cherry Grove, south of South Quay, no. 10,475.

Certainly highly localized in Virginia; perhaps not elsewhere known outside the Great Dismal Swamp. See pp. 469 and 488.

*NAJAS GRACILLIMA (A. Br.) Magnus. CAROLINE COUNTY: peaty pond-hole southeast of Milford, no. 8914. See p. 474.

Extension southward.

POTAMOGETON CAPILLACEUS Poir. To the single reported station in Nansemond County add the following. ISLE OF WIGHT COUNTY: rills, sandy and peaty border of Cat Pond, south of Benns Church, no. 8019. SOUTHAMPTON COUNTY: floating at border of Predler's Pond, Nottoway Swamp, southwest of Sedley, no. 8018; border of peaty pool in cypress-gum swamp, about 4 miles northeast of Capron, no. 7196. GREENSVILLE COUNTY: pool in *Cephalanthus* swamp, about 1 mile north of Skipper's, no. 8537.

ERAGROSTIS HYPNOIDES (Lam.) BSP. To the few stations add one in CHESTERFIELD COUNTY: margin of exsiccated old mill-pond in Swift Creek, Lakeview, no. 9272. See p. 477.

*E. POAEOIDES Beauv. CAROLINE COUNTY: railroad gravel southeast of Guinea, no. 8959. DINWIDDIE COUNTY: cinders in freight-yard of Norfolk and Western Railroad, Petersburg, no. 10,523. See p. 474.

No Virginian station indicated in Hitchcock's *Manual*.

*E. HIRSUTA (Michx.) Nees, var. **laevivaginata**, var. nov., vaginis glabris.—Maryland to Florida. TYPE from wooded alluvial bottomland of Meherrin River, near Haley's Bridge, Southampton County, VIRGINIA, *Fernald & Long*, no. 9273 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.).

Typical *Eragrostis hirsuta*, based on *Poa hirsuta* Michx., has strongly hirsute sheaths. It was described from South Carolina and is represented in the Gray Herbarium only thence to Florida and westward to Louisiana and Oklahoma, with the exception of Blake's no. 11,675 from a road-working in Arlington County, Virginia. All other material before me from Maryland, Virginia (Northampton, Princess Anne, Nansemond, Greensville, Southampton and Prince George Counties) and North Carolina and much from Georgia and northern Florida (for example, *Nash*, no. 2521, from Tallahassee) has

all or all but the very lowest sheaths quite glabrous except for the marginal and apical ciliation. This is so striking a departure from the generally more southern and western hirsute-sheathed plant that it is clarifying to have a designation for it. By the key in Hitchcock's Manual the student would be unable to identify the relatively common *E. hirsuta*, var. *laevivaginata*, for in Hitchcock's key the only provision for the inclusive species (p. 141) is under "Sheaths pilose or hirsute," although the description of *E. hirsuta* (p. 158) allows "sheaths hirsute to glabrous."

*FESTUCA OCTOFLORA Walt., var. TENELLA (Willd.) Fern. in RHODORA, XXXIV. 209 (1932). SUSSEX COUNTY: fallow sandy fields and roadsides 4 miles northwest of Homeville, no. 9835.

Our only collection of the small and mostly northern var. *tenella*. Typical southern *F. octoflora* is common.

MELICA MUTICA Walt. occurs as two forms on the Coastal Plain of Virginia. Typical M. MUTICA (*M. glabra* Michx.; *M. mutica*, var. *glabra* (Michx.) Gray), the plant with glabrous or merely scabrous sheaths, we have from the following stations. ELIZABETH CITY COUNTY: Hampton, May 1, 1894, *J. R. Churchill.* PRINCESS ANNE COUNTY: rich woods, Cedar Island, *Fernald, Griscom & Long*, no. 4560. SURRY COUNTY: rich calcareous wooded slopes along James River, Claremont Wharf, no. 9828 (1 m. high). DINWIDDIE COUNTY: borders of dry oak and pine woods north of Burgess Station, no 9827.

M. MUTICA Walt., forma **diffusa** (Pursh), comb. nov. *M. diffusa* Pursh, Fl. Am. Sept. i. 77 (1814). Var. *diffusa* (Pursh) Gray, Man. ed. 5: 626 (1867). With copiously pilose sheaths and, often, blades. NANSEMOND COUNTY: wooded slope, Kilby, no. 6484. SURRY COUNTY: rich wooded slope at head of Sunken Meadow Creek, south of Claremont, no. 7755. DINWIDDIE COUNTY: borders of dry oak and pine woods north of Burgess Station, no. 9829.

Very striking in its extreme, with gray-pilose sheaths and blades, forma *diffusa* occurs through much, if not all of the range of typical glabrous- or merely scabrous-sheathed *M. mutica*. It is therefore best treated as a form.

*CALAMOVILFA BREVIPILIS (Torr.) Scribn., var. **calvipes**, var. nov. (TAB. 573, FIG. 1 et 2), foliis scabris; paniculis valde exsertis laxe ovoideis 1.3–2 dm. longis 0.7–1 dm. diametro, ramis patentibus vel laxe subadscendentibus; pedicellorum apicibus nudis; spiculis 4–5 mm. longis; lemmatibus paleisque subaequalibus valde strigosis.—VIRGINIA: sphagnous bog about 1 mile northwest of Dahlia, Greensville County, July 15, 1938, *Fernald & Long*, no. 8548 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.). In PLATE 573, the habit, × ⅖ is shown in FIG. 1; a spikelet, × 10, in FIG. 2. See p. 472 and MAP 9.

Typical *Calamovilfa brevipilis* of the Pine Barrens of New Jersey, has less scabrous leaves; panicles often (though not always) with included or barely exserted bases, and slender (lanceolate to lance-ovoid), 1.5–3 dm. long and 4–10 (–14) cm. in diameter, the branches usually strongly ascending, though in age sometimes loosely spreading. Its pedicels (FIG. 3) are terminated by a tuft of stiffish hairs resembling those of the callus; the spikelets are 4.5–5.5 mm. long, with essentially equal lemma and palea (FIG. 3), these less pubescent than in the Virginian plant.

In southeastern North Carolina *Calamovilfa brevipilis* has a third variety. Its long-exserted lanceolate panicle resembles that of var. *typica*[1] of southern New Jersey; but the beard at the tips of the pedicels is much reduced, the spikelets (FIG. 4) are 5.5–6 mm. long and the lemmas and paleas are conspicuously unequal. This southernmost extreme of the species may be called

C. BREVIPILIS (Torr.) Scribn., var. **heterolepis**, var. nov. (TAB. 573, FIG. 4), var. *typicae* simillima; paniculis lanceolatis 2.1 dm. longis 5 cm. diametro, ramis valde adscendentibus; pedicellorum apicibus breviter pilosis; spiculis 5.5–6 mm. longis; lemmatibus paleisque valde inaequalibus.—NORTH CAROLINA: edge of swamp, between Coats and Erwin, Harnett County, "rare!", July 15, 1935, *Correll & Blomquist*, no. 2539 (TYPE in Herb. Gray).

Calamovilfa brevipilis must be a very ancient type. Its three known areas are on the Coastal Plain or at its inner margin and separated by distances of 125 and of 225 miles. Only var. *typica*, of the Pine Barrens of New Jersey, has an extended area, Stone saying of it: "Common in Pine Barren bogs. . . . This is one of the characteristic grasses of the Pine Barrens." Var. *heterolepis*, as quoted from the label is "rare!"; and, surely, the Virginian var. *calvipes* is one of the rarest plants of the state. Our station is a colony of not more than a square rod in the most perfect sphagnous bog of Greensville County, there associated with such excessively local plants as *Ctenium aromaticum*, *Paspalum praecox*, var. *Curtisianum* (*P. lentiferum*), *Lachnocaulon anceps*, *Xyris flexuosa*, *platylepis* and *Curtissii*, *Zigadenus angustifolius*, *Burmannia biflora*, *Oxypolis ternata*, *Utricularia juncea* and *virgatula*, and *Carphephorus tomentosus*.

*AGROSTIS ELLIOTTIANA Schultes. GREENSVILLE COUNTY: fallow

[1] CALAMOVILFA BREVIPILIS (Torr.) Scribn., var. **typica**. *Arundo brevipilis* Torr. Fl. No. Mid. U. S. i. 95 (1823). *C. brevipilis* (Torr.) Scribn. in Hackel, True Grasses, 113 (1890).

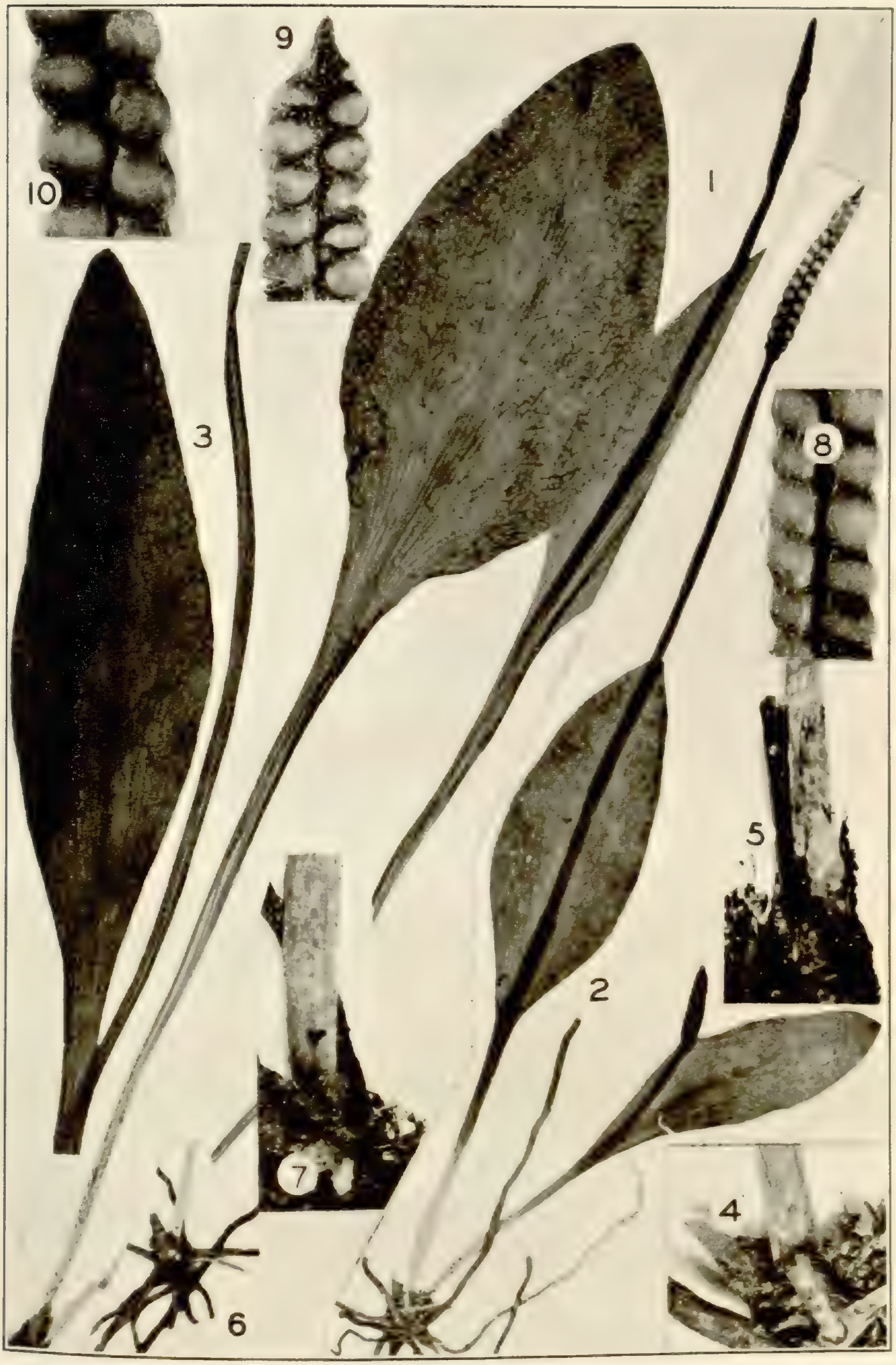


Photo. W. H. Hodge

OPHIOGLOSSUM VULGATUM, VAR. PSEUDOPODUM: FIG. 1, plant, × 1, from New Hampshire; FIG. 2, small plant, × 1, from Nova Scotia; FIG. 3, portion of ISOTYPE of *O. vulgatum*, forma *pseudopodum;* FIG. 4, base of common stalk, × 5, from Nova Scotia; FIG. 5, base of common stalk, × 5, from New Hampshire; FIG. 6, base of common stalk, × 1, from Vermont; FIG. 7, base of common stalk, × 5, from Vermont; FIG. 8, sporangia, × 10, from Nova Scotia; FIG. 9, sporangia, × 10, from Vermont; FIG. 10, sporangia, × 10, from ISOTYPE.

Photo. W. H. Hodge

CALAMOVILFA BREVIPILIS: FIG. 3, spikelet, × 10.
Var. CALVIPES: FIG. 1, habit, × 2/5; FIG. 2, spikelet, × 10.
Var. HETEROLEPIS: FIG. 4, spikelet, × 10.

argillaceous field and exsiccated pond-hole, north of Skipper's. no. 9816. See p. 470.

Not mapped for Virginia in Hitchcock's Manual.

AGROSTIS ELATA (Pursh) Trin. The vegetative character pointed out in RHODORA, XXXIX. 363 (1937) holds throughout the region. Characteristic of sphagnous bogs and wet pinelands, especially well developed in Greensville, Sussex and Dinwiddie Counties; there with very large panicles (up to 3.5 dm. long).

ARISTIDA LANOSA Muhl. SOUTHAMPTON COUNTY: dry white sand in woods, Terrapin Ridge, east of Drewryville, no. 8955.

Extension inland, 75 miles, from the coast of Princess Anne.

LEPTOCHLOA FILIFORMIS (Lam.) Beauv. To the few known Virginian stations add one in GREENSVILLE COUNTY: weed in cotton-field near Hitchcock Quarry, no. 9536.

SPARTINA ALTERNIFLORA Loisel., VAR. GLABRA (Muhl.) Fern. Extending inland at least to ISLE OF WIGHT COUNTY: brackish marsh along Cypress Creek, Smithfield, no. 8957.

CTENIUM AROMATICUM (Walt.) Hitchc. To the scattered Virginian stations recorded add one in GREENSVILLE COUNTY: sphagnous bog 1 mile northwest of Dahlia, no. 8550. See p. 472.

LEPTOLOMA COGNATUM (Schultes) Chase. Frequent from Dinwiddie and Prince George Counties southward.

Usually flowering in late summer and autumn; found in good flower in Southampton County on June 20.

AXONOPUS FURCATUS (Flügge) Hitchc. Northward to YORK COUNTY: swale southeast of Tabb's, no. 8553.

Not seen by Grimes.

PASPALUM DISSECTUM L. To the few stations in Southampton County add an extensive one in CHESTERFIELD COUNTY: margin of exsiccated old mill-pond in Swift Creek, Lakeview, no. 9254. See p. 477.

P. FLUITANS (Ell.) Kunth. See Fernald in RHODORA, XXXIX. 282, tab. 474, figs. 6–13 (1937). To the stations in Southampton County add an extensive one in CHESTERFIELD COUNTY: margin of exsiccated old mill-pond in Swift Creek, Lakeview, no. 9253. See p. 477.

Both *P. fluitans* and *P. dissectum* abound at this station. They are strongly contrasted in the mat of vegetation by the blue-green color of the latter, the warmer green of the former.

P. SETACEUM Michx., VAR. SUPINUM (Bosc) Trin. (*P. supinum* Bosc.). To stations in Northampton and Princess Anne Counties add the following. NANSEMOND COUNTY: woods about 2 miles southeast of Cleopus, no. 8928.

*P. URVILLEI Steud. WARWICK COUNTY: dry railroad bank, Naval Mine Depot, north of Lee Hall, no. 8556. NANSEMOND COUNTY: rail-

road bank near lumber camp of Camp Lumber Co., Great Dismal Swamp, southeast of Whitemarsh School, no. 10,490.

A strikingly distinct species, evidently adventive along the Naval railway. Itself well armored with promptly deciduous fine stinging bristles on the lower sheaths! See p. 469.

P. PRAECOX Walt., var. CURTISIANUM (Steud.) Vasey (*P. lentiferum* Lam.). To the single known Virginian station (in Sussex County) add one in GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 9255. See p. 485.

*PANICUM FUSIFORME Hitchc. DINWIDDIE COUNTY: dry clearings and borders of woods south of Burgess Station, no. 8560.

Extension north from Georgia. See p. 469.

P. NITIDUM Lam. To the few Virginian stations add one in GREENSVILLE COUNTY: wet cut-over pine and oak woods near Three Creek, north of Emporia, no. 8561.

P. MATTAMUSKEETENSE Ashe, var. CLUTEI (Nash) Fernald in RHODORA, xxxix. 386 (1937). Range extended inland to GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8562.

P. CAERULESCENS Hack. To the single station in Princess Anne County cited by Hitchcock & Chase add one in SUSSEX COUNTY: moist (in midsummer exsiccated) argillaceous pineland about 2 miles east of Stony Creek, nos. 8940, 9525 and 10,500. PRINCESS ANNE COUNTY: inner border of brackish to fresh marsh along Back Bay, at eastern margin of Long Island, no. 10,501.

Certainly a very rare species in Virginia. See p. 476.

P. ALBOMARGINATUM Nash. Inland to GREENSVILLE and SUSSEX COUNTIES.

P. TRIFOLIUM Nash. Inland to DINWIDDIE COUNTY.

P. ENSIFOLIUM Baldwin. Inland to DINWIDDIE and GREENSVILLE COUNTIES.

(*To be continued*)

LAST SURVIVORS IN THE FLORA OF TIDEWATER VIRGINIA

M. L. Fernald

(*Continued from p. 504*)

Cenchrus tribuloides L. Extending up the James to Surry County: sand-beach, Claremont Wharf, no. 8950.

Erianthus strictus Baldwin. Range extended inland to Greensville County: pond-hole in pine and oak woods near Three Creek, north of Emporia, no. 9241.

Reported in 1938 as new to Virginia. Now known to us as one of the commoner species of the region from York and Prince George Counties southward. Much earlier than the plumose species, flowering chiefly from July to September and quickly identified from the moving car by its slender and stiff plumeless panicle.

E. compactus Nash. Range extended inland from Sussex County to Dinwiddie and Greensville Counties.

Arthraxon hispidus (Thunb.) Makino, var. cryptatherus (Hackel) Houda. To the station in Elizabeth City County add one in Sussex County: turfy right-of-way by railroad, Jarratt, no. 9517.

*Manisuris rugosa (Nutt.) Kuntze. Sussex County: exsiccated argillaceous pineland about 2 miles east of Stony Creek, no. 8916.

An interesting station, connecting those of the Carolinas with the northern outliers in Delaware and southern New Jersey. See p. 476.

Cyperus flavescens L., var. **poaeformis** (Pursh), comb. nov. *C. poaeformis* Pursh, Fl. Am. Sept. i. 50 (1814). Plate 574, figs. 1–3.

C. flavescens L., var. **piceus** (Liebm.), comb. nov. *C. piceus* Liebm. in Vidensk. Selsk. Skr. Kjøbenh. ser. V. ii. (1851) 200. Plate 574, figs. 4 and 5.

True *Cyperus flavescens* of Eurasia and Africa has the mature achenes (figs. 6 and 7) blackish-brown, with vertical rows of oblong superficial cells and at most very obscure and tardily developed transverse zonation. In outline they are broadly obovate and (including stipe and apiculation) close to 1 mm. long. The plant of eastern North America, on the other hand, has achenes (figs. 2 and 3) with more prominent reticulation, the transverse ridges pronounced and in maturity becoming white bands of mineral substance suggesting

lines of frost-crystals; the body of the achene being black. In outline the achenes of this eastern North American plant (*C. poaeformis*) are rather narrowly obovoid or even ellipsoid and they measure 1–1.2 mm. long. This plant, var. *poaeformis*, extends from the West Indies and Florida to Texas, northward to southeastern New York, Pennsylvania, Ohio, Michigan, Illinois and Missouri.

In South America and Mexico *Cyperus flavescens* may have darker scales than in Europe or in the United States, but this character completely breaks down, although upon color alone Kükenthal in Engler, Pflanzenr. iv[20]. 395, 396 (1935) maintains *C. piceus* Liebm. as a species. This Mexican and South American material, inseparable in habit, spikelets and scales from *C. flavescens* and its var. *poaeformis* (the darkening of the scales being too instable a character), has achenes (FIGS. 4 and 5) intermediate between those two: dark-brown to black, broadly obovoid, 0.9–1 mm. long, with reticulation prominent but with the white transverse ridges less developed than in var. *poaeformis* or the white quite wanting. It seems to me a reasonably good tropical American variety. Var. POAEFORMIS abounds in eastern Virginia.

In PLATE 574, FIG. 1 is a plant, × 1, of *Cyperus flavescens*, var. *poaeformis*, from Cold Spring, New Jersey, *Gershoy*, no. 119; FIG. 2, achenes, × 10, from Virginia, *Fernald & Long*, no. 9277; FIG. 3, surface of achene, × 70, of no. 9277. FIG. 4 is a group of achenes, × 10, of var. *piceus*, from Mexico, *Pringle*, no. 11,299; FIG. 5, surface, × 70, of one of these achenes. FIGS. 6 and 7 show achenes, × 10, and their surface, × 70, of the European (typical) *C. flavescens*, from the Maritime Alps, *Moggridge*.

CYPERUS POLYSTACHYOS Rottb., var. **texensis** (Torr.), comb. nov. *C. holosericeus* Link, Hort. Berol. i. 317 (1827), fide Kükenthal. *C. microdontus* Torr. in Ann. Lyc. N. Y. iii. 255 (1836). *C. Gatesii* Torr. l. c. (1836). *C. microdontus*, β. *Texensis* Torr. l. c. 430 (1836). *C. fugax* Liebm. in Vidensk. Selsk. Skr. Kjøbenh. ser. 5: 196 (1851). *C. inconspicuus* Liebm. l. c. 197 (1851). *C. Liebmanni* Steud. Syn. Cyp. 7 (1855). *C. Texensis* (Torr.) Steud. l. c. 9 (1855). *C. polystachyus*, β. *Leptostachyus* Boeckel. in Linnaea, xxxv. 478 (1868); Kükenth. in Engler, Pflanzenr. iv[20]. 371 (1935). *Pycreus polystachyus*, var. β. *laxiflora* C. B. Clarke in Urb. Symb. Antill. ii[1]. 17 (1900). *C. filicinus*, var. *microdontus* (Torr.) Fernald in RHODORA, xix. 153 (1917).

There seems to me no question that our annual plant, varying from individuals with single tall culms to low and matted extremes, but always with linear spikelets only 1.2–2 mm. broad, the membranous dull obtuse or merely subacute and barely mucronulate scales 1.5–2

mm. long and the achenes only 0.8–1 mm. long, is a variety of the pantropical *Cyperus polystachyos*. It has been called many species, Torrey giving it at least three names; but accumulated material shows it, like other annuals, to be very plastic. The International Rules of Nomenclature require us to use the earliest published valid name in each category of classification. *C. microdontus*, β. *texensis* Torr. (1836) was based on immature material (before me) of the eastern American plant and the Drummond material upon which it was based is cited by Kükenthal under var. *leptostachyus*, which was not published until 1868.

Dwarf extremes of *Cyperus filicinus* Vahl (1806) (*C. Nuttallii* Eddy (1820)) simulate dwarfed plants of *C. polystachyos*, var. *texensis*, and on some of the Cape Cod ponds they are intermixed. It was this mixed material which lead me to reduce *C. microdontus* Torr. to varietal rank under *C. filicinus*. Boeckeler had a similar feeling about the two plants when he treated *C. filicinus* as *C. polystachyus*, var. *Macrostachyus* in Linnaea, xxxv. 479 (1868). *C. filicinus* is essentially a maritime species of Atlantic North America. *C. polystachyos*, var. *texensis* is tropical, extending northward in fresh (acid) soils to Cape Cod. I separate the two as follows.

C. FILICINUS. Spikelets linear-lanceolate, 1.5–3 mm. broad; scales 2–3.5 mm. long, oblong-lanceolate, subcoriaceous, lustrous, acute, prominently mucronate; achenes 1.2–1.4 mm. long.

C. POLYSTACHYOS, var. TEXENSIS. Spikelets linear, 1.2–2 mm. broad; scales 1.5–2 mm. long, narrowly elliptic-ovate, membranaceous, dull, obtuse or only subacute, barely mucronulate; achenes 0.8–1 mm. long.

Upon Curtiss, no. 3050, from Indian River, Florida, Kükenthal set up *Cyperus filicinus*, forma *splendens* Kükenth. in Engler, Pflanzenr. iv^{20}. 374 (1935). The sheet in the Gray Herbarium is inseparable from large extremes of *C. polystachyos*, var. *texensis* (such as *Curtiss*, no. 3049), except in its prolonged spikelets. Var. TEXENSIS is common in eastern Virginia.

C. STRIGOSUS L., var. ROBUSTIOR Britton. HENRICO COUNTY: sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, no. 8968. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8969.

Seen by us only in these two sphagnous areas, the very tall culms usually solitary, the very slender spikelets up to 4 cm. long.

C. FILICULMIS Vahl., var. OBLITUS Fern. & Grisc. Range extended

inland to Southampton County: dry white sands east of Drewryville, south of Franklin and south of Sebrell, many nos.

Eleocharis tenuis (Willd.) Schultes, var. pseudoptera (Weatherby) Svenson. Dinwiddie County: rich deciduous woods about old marl-pits east of Burgess Station, no. 9838. See p. 492.

Svenson's map 30, in Rhodora, xli. 53 (1939), indicates this characteristic plant as known in Virginia only on the Potomac.

E. albida Torr. To the two previously recorded stations (on the coasts of Northampton and Princess Anne) add one in Surry County: sandy tidal shore of Crouch Creek, east of Scotland, no. 8584 (culms wiry). See p. 467 and map 3.

*Scirpus novae-angliae Britton. Surry County: tidal marsh at mouth of Crouch Creek, east of Scotland, no. 8593.

First station from south of the lower Delaware. Whether or not the species can finally be maintained, the occurrence of this plant, characteristic of the coast of eastern Canada and New England, close to northern colonies of *Eleocharis albida* and with *Aeschynomene virginica* is at least noteworthy. See p. 467 and map 2.

S. fontinalis Harper, var. **virginiana**, var. nov., a varietate typica differt inflorescentiae ramis ramulisque valde adscendentibus.—Calcareous springheads, alluvial woods and cypress swamps, Surry County, Virginia: calcareous meadow near head of Sunken Meadow Creek, south of Claremont, April 10, 1938 (scarcely in anthesis), *Fernald & Long*, no. 7761; along rills and about springs, rich calcareous woods at head of Sunken Meadow Creek, June 12 and 13, 1938 (overripe), no. 8108; wooded calcareous springheads, Claremont Wharf, May 20,1939 (in anthesis), no. 9839 and June 22, 1939 (overripe), no. 10,143; alluvial woods along Gray's Creek, west of Old Courthouse Corners, May 20, 1939 (mature), no. 9840 (type in Herb. Gray, isotype in Herb. Phil. Acad.); border of cypress swamp, along College Run, about 1 mile west of Highgate, May 20, 1939 (in anthesis), no. 9841.

When this most interesting plant was discovered in 1938 it was identified, in spite of departure in habit of the terminal umbel, with *Scirpus fontinalis* of calcareous wooded springheads of Georgia, about 450 miles to the southwest (see Rhodora, xl. 376, 382 and 396 (1938)). We now find the Virginian plant thoroughly typical and always to be expected in the calcareous springheads and floodplains of creeks throughout the belt of fossiliferous Miocene marl-beds of Surry County; it presumably extends into Prince George at the west and into Isle of Wight at the east. All the collections are consistent in having strongly ascending rays of the terminal umbel and the latter

is rather denser than in the Georgian plant, in which the rays are more elongate and strongly divergent (as shown in *Harper*, no. 2185), thus suggesting the inflorescence of *S. divaricatus*. I can find no appreciable differences in foliage, spikelets and achenes, the latter remarkable for their very prolonged beaks. See p. 492 and MAP 15.[1]

RHYNCHOSPORA MACROSTACHYA Torr. Very local in southeastern Virginia; besides Grimes's stations on Lake Drummond and on the Chickahominy River we know only the following. PRINCE GEORGE COUNTY: muddy tidal shore of James River, Jordan Point, no. 8983 (plants 1.8 m. high).

Throughout the area *Rhynchospora corniculata* abounds, and often simulates *R. macrostachya*. The luxuriant development of the latter in tidal mud of the James, where it is associated with such halophytic species as *Sagittaria falcata*, is noteworthy. In New England the species is confined to the most acid of peats. See p. 475.

R. PERPLEXA Britton. Recorded in 1938 as new to Virginia. To the stations there noted add the following. GREENSVILLE COUNTY: pond-hole in pine and oak woods near Three Creek, north of Emporia, no. 9282.

R. CADUCA Ell. Previously recorded from two stations only (in Norfolk and Sussex Counties). Now known as occasional colonies (often quite extensive) northward to YORK and GLOUCESTER COUNTIES and inland to SOUTHAMPTON COUNTY (many nos.). See p. 467.

R. TORREYANA Gray. Recorded in 1937 as new to Virginia. Now known in many sphagnous swales and bogs from CHESTERFIELD COUNTY to GREENSVILLE COUNTY (many nos.).

SCLERIA MINOR (Britton) W. Stone. Local range extended to GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, nos. 8615, 9842.

S. SETACEA Poir. Rather general in sphagnous boggy areas inland to AMELIA COUNTY (north of Winterham, no. 9000) and DINWIDDIE and GREENSVILLE COUNTIES (several nos.).

CAREX BROMOIDES Schkuhr. Reported in 1938 only from a single station on the Coastal Plain. Rather frequent in calcareous alluvium and springy swamps of SURRY, SUSSEX and DINWIDDIE COUNTIES.

[1] Since this went to press, Mr. Alan A. Beetle has kindly called to my attention the fact that a collection from Murrell's Inlet, Georgetown County, South Carolina, *Weatherby & Griscom*, no. 16448 (as *S. divaricatus*) is good *S. fontinalis*. He also notes, as in the National Herbarium at Washington, other sheets in the covers of *S. divaricatus* but really belonging to *S. fontinalis:* one from Springfield, Alabama (*Mohr*), another from Alexandria, Louisiana (without other data). Similarly misidentified, I find in the Gray Herbarium two old sheets (without full data) from Florida and a Louisiana specimen from Josiah Hale. The range of *S. fontinalis* should be indicated on MAP 15 as extending from northern Florida to Louisiana, north into Georgia and eastern South Carolina.

*C. Jamesii Schwein. Surry County: rich calcareous wooded slopes along James River, Claremont Wharf, no. 9862.

Not seen by Mackenzie (N. Am. Fl.) from Virginia, its general range southward being through West Virginia, Kentucky, Tennessee and Missouri.

C. striatula Michx. To the single Coastal Plain station (in Sussex County) recorded in 1937 add the following: Dinwiddie County: dry hickory and oak woods 2–3 miles east of Dinwiddie, no. 9871. Southampton County: dry mixed woods by Applewhite Church, no. 10,161.

*C. amphibola Steud. Surry County: rich calcareous wooded slopes along James River, Claremont Wharf, no. 9874. Dinwiddie County: rich deciduous woods about old marl-pits east of Burgess Station, no. 9873. See p. 492.

Not recorded by Mackenzie (N. Am. Fl.) from between Maryland and South Carolina.

C. gracillima Schwein. Our only Coastal Plain station in Dinwiddie County: alluvial woods and thickets along Hatcher's Run, north of Burgess, no. 9680.

C. oxylepis Torr. & Hook. To the station in Chesterfield County recorded in 1937 add the following. Dinwiddie County: rich deciduous woods about old marl-pits east of Burgess Station, no. 9861. Sussex County: rich deciduous woods along Nottoway River, southwest of Homeville, no. 10,167. See p. 492.

*C. venusta Dew. Greensville County: sphagnous bog about 1 mile northwest of Dahlia, nos. 9880, 10,165. Southampton County: sphagnous swampy woods southwest of Applewhite Church, no. 10,166.

First from north of North Carolina. See p. 491.

C. venusta Dewey, var. minor Boeckel. (*C. oblita* Steud.). To the single station in Norfolk County, recorded in 1935, add the following. Prince George County: sphagnous boggy swale east of Gary's Church, no. 9881; seen but not collected in bog at head of Poo Run. Dinwiddie County: argillaceous and sphagnous bog ("Reams bog"), south of Burgess, no. 9879. Southampton County: wooded swamp about 7 miles south of Franklin, no. 9882. See p. 491.

C. caroliniana Schwein. Recorded in 1938 from a single station only. Now found to be common (mature in May, consequently not previously recognized in early April and mid-June) from Dinwiddie County to Surry County; south to Greensville and Southampton Counties.

C. Walteriana Bailey, var. brevis Bailey. To the two stations in Princess Anne County recorded in 1935 add the following. Sussex County: bushy swale south of Stony Creek, no. 9004. Southampton

Photo. W. H. Hodge

CYPERUS FLAVESCENS: FIG. 6, achenes, × 10, from Maritime Alps: FIG. 7. surface of achene, × 70, from Maritime Alps.

Var. POAEFORMIS: plant, × 1, from New Jersey; FIG. 2, achenes, × 10, from Virginia; FIG. 3, surface of achene, × 70, from Virginia.

Var. PICEUS: FIG. 4, achenes, × 10, from Mexico; FIG. 5, surface of achene, × 70, from Mexico.

Photo. W. H. Hodge

APIOS AMERICANA: FIG. 3, inflorescence, × 1, from New York.
Var. TURRIGERA: FIG. 1, inflorescence, × 1 from Virginia (TYPE); FIG. 2, inflorescences, × 1, from South Carolina.

COUNTY: wooded swamp about 7 miles south of Franklin, no. 9884. See p. 490.

*C. VERRUCOSA Muhl. SOUTHAMPTON COUNTY: swampy woods southwest of Branchville, no. 9286.

Not recorded by Mackenzie (N. Am. Fl.) from north of South Carolina.

*C. HYALINOPSIS Steud. (*C. riparia*, var. *impressa* S. H. Wright). SURRY COUNTY: sandy tidal shore of Crouch Creek, east of Scotland, no. 8620.

Not seen by Mackenzie (N. Am. Fl.) from between North Carolina and southern New Jersey. See p. 467.

*C. LUPULIFORMIS Sartw. YORK COUNTY: swampy woods east of Tabb's, no. 8623.

First from south of Delaware.

*XYRIS PLATYLEPIS Chapm. To the doubtful report from Charles City County by Mrs. Erlanson add the following, without doubt. HENRICO COUNTY: sphagnous springy swales and boggy thickets bordering Whiteoak Swamp, west of Elko Station, nos. 9007, 9008. NANSEMOND COUNTY: seeping bank of ditch at margin of woods, about 2 miles southeast of Cleopus, no. 9009. GREENSVILLE COUNTY: wooded swamp along Mill Creek, about 1 mile north of Skipper's, no. 8636; sphagnous bog about 1 mile northwest of Dahlia, nos. 8637, 9551.

Very characteristic in its large bulbous bases covered by short castaneous scales and in its broad spiraling leaves. See pp. 470, 473.

X. CURTISSII Malme. To the first Virginian station (first station recorded from north of Georgia), recorded in 1937 in Sussex County, add the following. DINWIDDIE COUNTY: argillaceous and sphagnous bog ("Reams bog"), south of Burgess, no. 9011. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8635. See pp. 470, 473.

X. FLEXUOSA Muhl. (*X. arenicola* Small). To the first Virginian station (pine barrens, Isle of Wight County), recorded in 1937, add the following. DINWIDDIE COUNTY: argillaceous and sphagnous bog ("Reams bog"), south of Burgess, no. 9010. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, no. 8638. NANSEMOND COUNTY: sandy and peaty pine barrens east of Cox Landing, south of South Quay, no. 10,566, very abundant. See p. 472.

*JUNCUS SECUNDUS Beauv. SUSSEX COUNTY: new roadside gravel near Nottoway River, southeast of Homeville, no. 10,184. GREENSVILLE COUNTY: fallow argillaceous field and exsiccated pond-hole, north of Skipper's, no. 9888. See p. 490.

J. CAESARIENSIS Coville (*J. asper* Engelm.). To the Virginian station (in James City County) of Grimes add the following in

Henrico County: open wet sandy and peaty *Magnolia* thicket in Whiteoak Swamp, east of Elko Station, no. 8650; sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, nos. 9016, 9292.

A very extensive colony 25 miles northwest of Grimes's station. See pp. 470, 473.

Helonias bullata L. Henrico County: bushy sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, no. 9295.

Our first Coastal Plain station in Virginia, the plant associated with *Parnassia asarifolia, Juncus caesariensis* and other species far-isolated from their better known centers of occurrence. See p. 478.

Chamaelirium luteum (L.) Gray. Greensville County: dry pine and oak woods and thickets near Three Creek, north of Emporia, very local, no. 9296. Southampton County: rich mixed and deciduous woods near Nottoway River, above Carey Bridge, no. 10,198. Sussex County: badly broken and eaten specimens once seen (in 1936) at border of woods east of Homeville.

Certainly very local on the Virginian Coastal Plain. See p. 485.

Amianthium Muscaetoxicum (Walt.) Gray. Southampton County: border of wooded swamp about 7 miles south of Franklin, nos. 9892, 10,199. Nansemond County: sphagnous savannah-like swale east of Cherry Grove, south of South Quay, no. 10,578, abundant.

Very definite stations on the Virginian Coastal Plain. In Rhodora, xxxix. 364 and 399 (1937), I recorded a station south of Factory Hill in Nansemond County. Retravel of the road shows that the latter station is a few rods over the state line in Gates County, North Carolina! See p. 490.

*Zigadenus angustifolius (Michx.) Wats. (*Tracyanthus angustifolius* (Michx.) Small.). Greensville County: sphagnous bog about 1 mile northwest of Dahlia, nos. 6565, 9891, only a few plants.

Extension north from North Carolina. See pp. 470, 491 and map 6.

Z. glaberrimus Michx. Range extended inland to Dinwiddie County: argillaceous and sphagnous bog ("Reams bog"), south of Burgess, no. 9026; seen in some abundance some miles northwest of Burgess.

Uvularia **pudica** (Walt.) comb. nov. *Anonymos pudica* Walt., Fl. Carol. 123 (1788). *U. puberula* Michx. Fl. Bor.-Am. i. 199 (1803).

U. pudica (Walt.) Fern., var. **nitida** (Britton), comb. nov. *Oakesia sessilifolia*, var. (?) *nitida* Britton in Trans. N. Y. Acad. Sci. ix. 13 (1889). *U. sessilifolia nitida* (Britton) Morong in Mem. Torr. Bot. Cl. v. 111 (1894). *U. nitida* (Britton) Mackenzie in Torreya, viii. 14

(1908). *U. puberula*, var. *nitida* (Britton) Fernald in RHODORA, xxxvii. 407, t. 392, figs. 2, 3 and 6 (1935).

Walter's unnamed but clearly defined genus *Anonymos*,[1] *Erythronio affinis* in his Fl. Carol. 122 (1788), had in five paragraphs a good diagnosis. His generic characters, with "*capsula* turbinato-triangularis . . . Sem. *bina* in singulo loculamento depresso-globosa, ab uno latere cincta membrana vesiculari" is closely similar to Michaux's characterization of *Uvularia*, with "Cap. . . . trigona, angulis compressis . . . Sem. . . . abortatione solito paucissima; irregulariter subglobosa; ad hilum arilata," and the single species, *Anonymos pudica*, was clearly described:

> *pudic.* 1. radice fibrosa, caule pedali, foliis amplexicaulibus alternatis ovatis, floribus terminalibus, flavescentibus, plerumque solitariis, cernuis.

Examining Walter's herbarium in 1839, Asa Gray recorded: "*Anonymos* (*Erythronio* aff.) *pudica!* = *Uvularia puberula!* Læaves with a long slender acumination [such as is frequently accentuated in pressed specimens through puckering of the upper half of the leaf], flowers & fruit none: two slender terminal peduncles." The original description of *Uvularia puberula* Michx. was very brief, but it stressed the plant "foliis . . . ovalibus, basi rotundatis, subamplexicaulibus". There is no reason to doubt Gray's identification; there is every reason to accept it. *U. pudica* (*U. puberula*) is frequent on the coastal plain of Virginia and the Carolinas and I have before me very characteristic material from Santee Canal. Walter's Flora was written "ad Ripas Fluvii Santee".

In southeastern Virginia U. PUDICA (typical) is occasional in woods from eastern Nansemond County westward, passing to

*Var. NITIDA (Britton) Fern. supra. SOUTHAMPTON COUNTY: dry sandy open pine and oak woods and thickets 6 to 7 miles south of

[1] I realize that Walter's beautifully described new genera, which, in his modesty, he hesitated to name and called *Anonymos*, are subject to ridicule by some of the younger English botanists; but, as repeatedly pointed out, as for instance by Blake in RHODORA, xvii. 130 (1915), the species under these nameless but clearly defined genera are perfectly valid *as species*. The fact that Blake in 1915 did not find some types of Walter's which were studied by Gray in 1839 is significant. In his manuscript of a full century ago Gray noted under *Clematis holosericea*, which Pursh described from a specimen said to be in "*Herb. Walter*": "There is nothing in Walter's herb. to correspond to this . . . Pursh must have carried off the specimen, or part of it." Then follows in another ink: "P. S. He has taken it all to herb. Lambert—which see." Pursh and his patron, Lambert, were not the only early botanists who felt that Walter's plants would be of better service elsewhere (for instance, see note on *Lobelia glandulosa* by Fernald & Griscom, RHODORA, xxxix. 497).

Franklin, no. 9895. NANSEMOND COUNTY: sandy and peaty pine barrens east of Cox Landing, south of South Quay, no. 10,580.

First from south of New Jersey.

*HEMEROCALLIS FULVA L., var. KWANSO Regel. SOUTHAMPTON COUNTY: well established by roadside near Oak Grove School, no. 8202.

Single-flowered *Hemerocallis fulva* is one of the abundant roadside plants; we have not before found var. *Kwanso* established as a wild plant.

LILIUM CAROLINIANUM Michx. GREENSVILLE COUNTY: open thickets, clearings and borders of woods southeast of Emporia, no. 9298, scarce; clearing at border of dry pine and oak woods, south of Skipper's, in some abundance, no. 9557. SUSSEX COUNTY: border of dry mixed woods east of Grizzard, very scarce, no. 10,202; border of dry woods northwest of Jarratt, no. 11,005. PRINCE GEORGE COUNTY: border of dry pine and oak woods 2–3 miles north of Disputanta, no. 11,004.

Characteristic of high altitudes in the Blue Ridge and the Alleghenies. See p. 485 and MAP 13.

ALETRIS AUREA Walt. To the few recorded Virginian stations add the following. GREENSVILLE COUNTY: peaty openings bordering wooded swamp along Mill Creek, about 1 mile north of Skipper's, no. 8669; sphagnous bog about 1 mile northwest of Dahlia, no. 8670 (racemes up to 3 dm. long). BRUNSWICK COUNTY: argillaceous swale about 5 miles east of Edgerton, no. 8671. See p. 472.

*DIOSCOREA BATATAS Dcne. SURRY COUNTY: established along roadside, Spring Grove, no. 9559.

BURMANNIA BIFLORA L. GREENSVILLE COUNTY: peaty openings bordering wooded swamp along Mill Creek, about 1 mile north of Skipper's, no. 9561; sphagnous bog about 1 mile northwest of Dahlia, nos. 8676, 9035, 9303. SOUTHAMPTON COUNTY: mossy pineland southeast of Sands, no. 9560.

With the exception of a collection (locality not noted) by Nuttall (Herb. Phil. Acad.) *Burmannia biflora* has apparently been unknown in Virginia since the type was collected more than two centuries ago by Clayton. Britton (*Man.*) gives the flowering period as "Sept.–Nov." In the bog near Dahlia we had unexcelled opportunity to observe the plant, which there makes an interrupted porcelain-blue film beneath half-an-acre of *Lachnocaulon anceps*, *Panicum strigosum* and other characteristic sphagnophilous plants. The first flowers were collected on July 15; on August 20 the plant was generally in flower; and on September 18 it was mature, the taller fruiting plants

1.7 dm. high, with forking inflorescences up to 3.2 cm. long. On October 14 it seemed not to have changed, though on that date it was just flowering north of Skippers. On December 31 the bog had become severely frosted and *Burmannia* was dry and scarcely recognizable. See pp. 472, 485, 488, 491 and MAP 7.

SPIRANTHES OVALIS Lindl. To the stations already recorded (in Henrico, Sussex and Southampton Counties) add one in DINWIDDIE COUNTY: rich woods about an old marl-pit, about 2 miles east of Burgess Station, no. 9563. See pp. 486, 492.

PONTHIEVA RACEMOSA (Walt.) Mohr. Add another very extensive station in SURRY COUNTY: rich deciduous woods 1½ miles east of Blizzard's Corners, no. 9305. See p. 477.

CORALLORRHIZA WISTERIANA Conrad. SURRY COUNTY: rich deciduous woods, ravine northwest of Bacon's Castle, no. 9707.

The statement on p. 489, that our station for *Corallorrhiza Wisteria: a* is the first in Virginia, is incorrect. Dr. Wherry very kindly writes me of stations in the uplands of the state, in Fairfax and Loudon Counties.

MALAXIS BAYARDI Fern. To the original station (in Nansemond County) add another on the Coastal Plain. GREENSVILLE COUNTY: dry pine and oak woods, about 1 mile north of Skipper's, no. 8906, very scarce. See p. 469.

In neighboring woodlands all the plants seen were of the relatively frequent *Malaxis unifolia* Michx.

APLECTRUM HYEMALE (Muhl.) Torr. To the Coastal Plain stations (in Surry County) already noted add others in PRINCE GEORGE and DINWIDDIE COUNTIES: all in highly calcareous areas. See pp. 486, 489.

SALIX LONGIPES Shuttlew., var. VENULOSA (Anderss.) Schneider. To the stations recorded in Norfolk County (in 1937) add the following. NANSEMOND COUNTY: border of damp woods, South Quay, no. 9567. GREENSVILLE COUNTY: shallow pond-hole in woods, just north of Dahlia, no. 8691 (large trees, the foliage with balsamic odor); pond-hole in pine and oak woods near Three Creek, north of Emporia, no. 9309 (large trees).

The slenderest-leaved extreme, closely matching the narrowest-leaved twigs of *Curtiss*, no. 5826, from Jacksonville, Florida, identified by Schneider.

CASTANEA NEGLECTA Dode. NANSEMOND COUNTY: sandy woods by Blackwater River, George's Bend, south of South Quay, no. 10,613. SURRY COUNTY: rich deciduous woods 1½ miles east of Blizzard's Corners, no. 9312. DINWIDDIE COUNTY: border of dry sandy woods east of Burgess, no. 10,232. SOUTHAMPTON COUNTY: mixed woods near Nottoway River, above Carey's Bridge, no. 10,612.

Although often called a hybrid of *Castanea dentata* and *C. pumila*, the shrubs east of Burgess are several miles from the nearest trees of *C. dentata* which used to be known to our driver and assistant, Leonard Birdsall, on whose land *C. neglecta* occurs. At the Surry County station both *C. dentata* and *C. pumila* were in the vicinity; but the shrubs in Nansemond seem to be removed by very many miles from the eastern limit in the state of *C. dentata*. *C. neglecta* appears to be a definite species.

Quercus cinerea Michx. Range extended northwestward in Southampton County: dry white sand in oak and pine woods and clearings bordering Assamoosick Swamp, south of Sebrell, no. 9911. Found in Nansemond County: sandy pine barrens east of Cherry Grove, south of South Quay, no. 10,619.

Polygonum tenue Michx. To the station already reported, in Isle of Wight County, add one in Caroline County: border of sandy woods of *Pinus virginiana*, about 1½ miles northwest of Bowling Green, no. 9041.

P. lapathifolium L. Chesterfield County: dominant on silt of Appomattox River, Pocahontas, no. 9318.

The only time seen by us in eastern Virginia.

*P. pensylvanicum L., var. durum Stanford in Rhodora, xxvii. 180 (1925). Isle of Wight County: weed in cultivated field, north of Walters, no. 8705. Greensville County: border of cultivated field, about 1 mile northwest of Dahlia, no. 8704.

Extension north from South Carolina; presumably generally distributed in southeastern Virginia. Quickly distinguished by the nearly or quite glandless appressed-strigose stiff peduncles. See p. 469.

P. robustius (Small) Fernald. Prince George County: muddy tidal shore of James River, Jordan Point, no. 9043.

The glandular dots which appear on the perianth when dry are largely if not wholly post-mortem.

Acnida cannabina L. Extending up the James at least to Prince George County.

*Mirabilis Jalapa L. York County: abundant about a dump, in the woods southeast of Yorktown, no. 8706.

*Stellaria prostrata Baldw. (*Alsine Baldwinii* Small.). Greensville County: forming close yellowish-green mats in lawns and grass-lands, Emporia, no. 9722. Southampton County: similar habitat, Courtland, no. 9723; also seen in Franklin.

Range extended northward from Georgia. In its closely depressed yellow-green mats and promptly disarticulating mature small calices and capsules *Stellaria prostrata* is very distinct. In southeastern

Virginia it is becoming a very objectionable weed of lawns, completely monopolizing the ground, maturing in late March and early April and by May leaving naked areas. See p. 489.

*Cerastium brachypodum (Engelm.) Robinson. Dinwiddie County: plowed land at border of rich woods, Cattail Creek, south of Burgess, no. 9718.

First north of Georgia. A characteristic species of the Gulf Coastal Plain and Mississippi Basin, thence west to Arizona and east to Georgia. At Cattail Creek apparently native, though intruded upon and stimulated by plowing of the area. Not found away from the border of the woods nor showing a tendency to spread into the cultivated field. See p. 489.

*C. brachypetalum Desp. Southampton County: open sandy roadside 6–7 miles south of Franklin, no. 9922.

A very distinct European species, the bracteal leaves ending in tufts of trichomes. The first record from North America. See p. 490.

*C. vulgatum L., var. holosteoides Fries. Southampton County: roadsides and waste places, Courtland, no. 9921.

New to North America. A very striking plant, with only minutely hirtellous stems and nearly glabrous blue-green obtuse leaves. See p. 490.

Ranunculus laxicaulis (T. & G.) Darby. *R. oblongifolius* of authors generally, not Ell.

The very slender plant of the South, which regularly passes as *Ranunculus oblongifolius*, has filiform loosely sprawling stems, these weak stems and the diffuse panicle soon proliferating and developing flabelliform leafy divergent offshoots and wide-spreading repent stolons; its oblong petals conspicuously exceed the sepals, and the subglobose achenes have a subulate (soon deciduous) style.

When Elliott (Sk. ii. 58) described his *Ranunculus oblongifolius* he doubted its distinctness from *R. pusillus* Pursh. His diagnosis and comment were as follows:

> *Root* fibrous. *Stem* 1–2 feet high, generally erect or declining, glabrous, smooth, branching and from the smallness of the upper leaves appearing naked towards the summit. *Leaves* oblong, irregularly denticulated, glabrous, the lower on petioles 1–3 inches long. *Peduncles* 10–15 lines long. *Calyx* at first closely appressed. *Petals* rather longer than the calyx. *Seeds* smooth without a vestige of the style, globose, with a slight longitudinal cicatrice.
>
> This species which I propose with hesitation, differs from the preceding [*R. pusillus*] much in size, and appears to differ in the corolla and seed. It requires however, to be further examined.

Grows in ditches and wet places. Collected 12 miles from Savannah on the Augusta road. St. John's Berkley. Dr. Macbride.
Flowers May–July.

The diagnosis suggests *Ranunculus pusillus* rather than the very lax plant with few loosely paniculate long-stalked and relatively large flowers which regularly passes as *R. oblongifolius*. It was, therefore, not wholly surprising, when Mr. Long and I studied Elliott's material at Charleston in early April, to find that the type of *R. oblongifolius* is characteristic large material of *R. pusillus* Pursh.

For *R. oblongifolius* of authors the best name is apparently *R. laxicaulis* (T. & G.) Darby (1855). No one who is familiar with so-called *R. oblongifolius* would balk at the propriety of the name *laxicaulis;* it is most fitting. *R. laxicaulis* started as *R. Flammula,*

β. laxicaulis: stem weak, much branched; leaves all entire; lowest ones elliptical-oblong, upper ones linear; petals oblong, attenuate at the base, three times as long as the calyx . . .
β. Milledgeville, Georgia. *Dr. Boykin.* July.— . . . Peduncles 1–2 inches long. Flowers 4–5 lines in diameter.—T. & G. Fl. i. 16 (1838).

Darby's fuller account was as follows:

R. LAXICAÚLIS, (T. & G.) *Stem* weak, much branched, declined, rooting at the lower joints, glabrous. *Leaves* smooth, linear-lanceolate, or elliptical, oblong; upper ones linear. *Peduncles* opposite the leaves, 1–2 inches long. *Carpels* with a subulate beak in a globular head. *Petals* much longer than the calyx, slender at the base.— ♄ . Ditches, Car. and Geo. July.—Darby, Bot. So. States, 204 (1855).

Both the original Torrey & Gray account of Boykin's plant and the fuller account by Darby are perfect descriptions of the plant erroneously passing as *R. oblongifolius*. This I intimated in 1936 (RHODORA, XXXVIII. 175), when I showed that the name *R. laxicaulis* certainly does not belong to *R. ambigens* Wats. Although, as then stated, the type can not be found, the descriptions are so convincing to one who has followed through the surrounding vegetation the "weak, much branched, declined" stems, "rooting at the lower joints," that I now have no hesitation in taking up for *R. oblongifolius* of authors, not Ell. the appropriate name R. LAXICAULIS (T. & G.) Darby.

In Virginia RANUNCULUS LAXICAULIS is local in HENRICO, ISLE OF WIGHT, SUSSEX and SOUTHAMPTON COUNTIES (many nos.).

R. MICRANTHUS Nutt. PRINCE GEORGE COUNTY: base of calcareous wooded slope, City Point, no. 9724; rich wooded ravine southeast of Hopewell, no. 9725; rich deciduous woods, Coggins Point, no. 9927.
See p. 488.

The plant of rich calcareous woods in eastern Virginia is strikingly unlike that of thin rocky soils in New England, New York, northern New Jersey and Pennsylvania, being of a dark green color, with lustrous leaf-surfaces, the simple basal leaves usually subcordate to strongly cordate; whereas the northern plant of thin soils is paler green, with opaque foliage, the simple basal blades merely subtruncate to cuneate at base. The plant with lustrous leaves is coarser and the teeth of its basal leaves are broadly flattened or squared across the top but the teeth of the simple basal leaves of the smaller opaque and pale-green northern plant are more prolonged and short-ovate or dentate.

Nuttall described *Ranunculus micranthus* from Arkansas. The type, preserved in the Gray Herbarium, is like the plant of Prince George County. The smaller plant with more truncate-based and crenate-dentate simple basal leaves is

R. MICRANTHUS Nutt., var. **delitescens** (Greene), comb. nov. *R. delitescens* Greene in Am. Midl. Nat. iii. 333 (1914).

Another variety, from Indiana, with deeply cordate simple basal leaves but with the teeth much prolonged, is

R. MICRANTHUS Nutt., var. **cymbalistes** (Greene), comb. nov. *R. cymbalistes* Greene, l. c. (1914).

R. CAROLINIANUS DC. *R. palmatus* of recent Am. auth., not Ell.

One of the most definite species of the southeastern Coastal Plain is the slender and finally strongly repent plant which passes as *Ranunculus palmatus*. Separated from its allies (*R. septentrionalis* Poir. and *R. hispidus* Michx.) by its short (3.5–5 mm. long) and promptly reflexed glabrous sepals, its relatively short and narrow oblong petals, and by the few very large mature achenes (with bodies 3.7–5 mm. long), with the broad (0.5–1 mm.) marginal wing separated from the faces by high acute ridges, the species is further distinguished from the other tardily repent species, *R. septentrionalis*, by its very slender habit and small smoothish leaves, and heads with only 10–20 achenes. In the southern so-called *R. palmatus* the best-developed basal leaves have 3 mostly petiolulate rhombic-ovate, cuneate 3-cleft or 3-divided and sharply toothed leaflets.

In view of the very definite characters of this southern Coastal Plain type, it is, therefore, important to note of Elliott's account (Sk. ii. 61, with important notes on p. 62) that his *R. palmatus*, published with a mark of doubt, was hairy, the leaves "those of the root

palmately 3 parted" and that (on p. 62) he specifically stated that "in the R. palmatus, the leaves as far as I have seen them, are never divided to the base, and are very hairy". In other words Elliott's description calls for something quite different from *R. palmatus* sensu American authors (not Elliott). It was, consequently, reassuring, when Mr. Long and I studied Elliott's type at Charleston, to find that it is one of the states of *R. hispidus* Michx. with appressed pubescence. There are abundant achenes and these are of *R. hispidus*.

The plant nowadays incorrectly called *R. palmatus* is *R. carolinianus* DC. Syst. i. 292 (1817), with "foliis glabriusculis trisectis trilobisve, lobis ovatis subincisis dentatis, calyce glabriusculo reflexo petalis paulò breviore," from "Carolina inferiore". Elliott copied DeCandolle's description of approximately the same date but he did not know the plant, merely noting:

> Radical leaves trisected or three lobed, segments and lobes ovate, obtuse, and obtusely toothed. DeCand.
>
> This plant appears to resemble the preceeding species [*R. palmatus*], but in the R. palmatus, the leaves as far as I have seen them, are never divided to the base, and are very hairy.

The basal leaves, the smooth and reflexed sepals and the "petalis potiùs oblongis quàm obovatis" of DeCandolle's account of *Ranunculus carolinianus* are conclusive. Furthermore, Asa Gray, examining the type at Geneva, made the memorandum: "I have no form so slender and few- and large-fruited as the *R. Carolinianus* DC. *R. palmatus* Ell. in Hb. Torr. from Chapman.—Feb., 1886." No material of this southern species was in the Gray Herbarium during Gray's lifetime. *R. palmatus* sensu auth., not Ell. becomes, then, R. CAROLINIANUS DC.

In Virginia RANUNCULUS CAROLINIANUS is found in low woods, on wet bottomlands and by streams in GLOUCESTER, NORFOLK, PRINCE GEORGE and SOUTHAMPTON COUNTIES (many nos.).

RANUNCULUS SARDOUS Crantz. The small station previously reported doubtless had its origin from a very extensive one in SOUTHAMPTON COUNTY: very abundant weed, not eaten by cattle, in pastures, on roadsides and in fields about Franklin, no. 9933.

Destined to become a pernicious weed unless vigorous measures for several years are taken to eradicate it.

ANEMONELLA THALICTROIDES (L.) Spach. Range extended eastward to SURRY COUNTY: rich calcareous woods, ravine 1½ miles north of Surry, no. 9727.

THALICTRUM REVOLUTUM DC. To the stations along the James add

the following. DINWIDDIE COUNTY: rich deciduous woods about old marl-pits east of Burgess Station, no. 9934. SUSSEX COUNTY: dry woods bordering Assamoosick Swamp, about 2 miles northeast of Homeville, no. 10,263.

T. MACROSTYLUM (Shuttlew.) Small & Heller. HENRICO COUNTY: sphagnous springy swales bordering Whiteoak Swamp, west of Elko Station, nos. 8710, 8711, 9050. JAMES CITY COUNTY: wooded flood-plain, Longhill, *Grimes*, no. 4086 (as *T. polygamum*). See p. 470.

Chiefly a plant of the upland.

CLEMATIS PANICULATA Thunb. Abundantly naturalized in damp thickets and swamps and on shores, PRINCE GEORGE, GREENSVILLE and ISLE OF WIGHT COUNTIES (many nos.).

*C. PANICULATA, var. DIOSCOREAEFOLIA (Lév. & Vaniot) Rehder. PRINCE GEORGE COUNTY: abundant along the James from City Point to Jordan Point, nos. 8714, 9052.

*BERBERIS THUNBERGII DC. CHESTERFIELD COUNTY: abundantly naturalized, alluvial woods and clearings, Pocahontas, no. 9324.

CARDAMINE DOUGLASSII (Torr.) Britton. PRINCE GEORGE COUNTY: rich bottomland woods along Wall's Creek, no. 9736. SURRY COUNTY: bottomland woods, calcareous ravine, 1½ miles north of Surry, nos. 9737 (petals deep purple), 9738 (petals paler). See p. 489.

*C. PENSYLVANICA Muhl., var. BRITTONIANA Farwell. Characteristic of wooded springheads and wooded brooksides, especially in calcareous areas. PRINCE GEORGE COUNTY: alluvial woods by Wall's Run, northwest of Garysville, no. 9937. SURRY COUNTY: springhead, bottomland woods in calcareous ravine 1½ miles north of Surry, no. 9739. NORFOLK COUNTY: border of gum swamp west of Cedar Hill, *Fernald & Griscom*, no. 4420. PRINCESS ANNE COUNTY: wooded (gum) swamp, Oceana, *Fernald & Griscom*, no. 4419.

*CAPSELLA RUBELLA Reut. Frequent or common in waste places and on roadsides (several nos.).

× SARRACENIA CATESBAEI Ell. GREENSVILLE COUNTY: with the two parents, sphagnous bog about 1 mile northwest of Dahlia. no. 8716. See p. 472.

DROSERA BREVIFOLIA Pursh. To the three records (from Nansemond, Elizabeth City and Greensville Counties) already noted add the following. DINWIDDIE COUNTY: argillaceous and sphagnous bog ("Reams bog"), south of Burgess, no. 9574; wet argillaceous and siliceous depressions north of Burgess Station, no. 9939. SUSSEX COUNTY: sandy and peaty depression (exsiccated shallow pond) about 4 miles northwest of Homeville, no. 9940; peaty and argillaceous swale north of Littleton, no. 9941. NANSEMOND COUNTY: seeping bank of ditch at margin of woods, about 2 miles southeast of Cleopus, no. 9573.

Drosera brevifolia is probably rather common in the area but usually overlooked. Its flowering season is very limited, in May (possibly

early June); and the large (1–1.4 cm. broad) white flowers close promptly at noon. Through the hot summer the shrivelled plants are very inconspicuous but in October the new deep-red rosettes appear in profusion. See p. 487.

Saxifraga virginiensis Michx. Local range extended well into the Coastal Plain in Surry County: rich wooded ravine northwest of Bacon's Castle.

Deutzia scabra Thunb. Surry County: roadside thicket, Claremont Wharf, no. 9942.

Pyrus serotina Rehder. Rather frequent at borders of woods in Dinwiddie, Surry and Southampton Counties (several nos.).

Rubus phoenicolasius Maxim. Chesterfield County: thickets, Pocahontas, no. 9335.

Potentilla recta L. Railroad banks and waste places, becoming frequent, Dinwiddie County to Greensville County (several nos.).

Aeschynomene virginica (L.) BSP. Prince George County: border of rich alluvial thicket back of sand-beach of James River, Jordan Point, no. 9343. Surry County: sandy beach of James River, at mouth of Crouch Creek, east of Scotland, nos. 8724, 9344, 9580. James City County: tidal shore, Back River, opposite Jamestown Island, no. 11,052. Charles City County: sandy tidal shore of Chickahominy River, Ferry Point, no. 11,053.

Reinstatement of an interesting plant to the flora of the state. Apparently not previously known in Virginia since the collection of the type by Clayton. See pp. 466 and 475 and map 1, also Rhodora, xxxix. 473 (1937).

*Desmodium ochroleucum M. A. Curtis. Caroline County: border of sandy woods of *Pinus virginiana*, about 1½ miles northwest of Bowling Green, no. 9066. Sussex County: dry sandy hickory and oak woods, Burt, no. 6237.

One of the very rare species of the genus, thoroughly distinct in its creamy petals, changing to yellowish, and in its twisted and not always clearly articulated segments. See p. 474.

D. rhombifolium (Ell.) DC. To the records from Norfolk and Isle of Wight Counties add the following from Southampton County: border of dry sandy woods, Mars Hill Church, no. 9067; dry sandy open pine and oak woods 6 to 7 miles south of Franklin, no. 8728.

Lathyrus hirsutus L. Recorded in Rhodora, xxxix. 433 (1937) as new to Virginia. Now rather common in Henrico, Dinwiddie, Prince George and Surry Counties (many nos.).

*Apios americana Medikus, var. **turrigera**, var. nov. (tab. 575, fig. 1 et 2), racemis laxis lanceolato- vel ovoideo-attenuatis, apice prolongatis.—Southeastern and central United States, apparently local. The following specimens are before me. Virginia: rich alluvial

Photo. W. H. Hodge

OENOTHERA FRUTICOSA, var. MICROCARPA: FIG. 1, summit of TYPE, × 1; FIG. 2, capsule, × 5.

Var. SUBGLOBOSA: FIG. 3, capsule, × 5, from Georgia.

Photo. W. H. Hodge

OENOTHERA FRUTICOSA, var. UNGUICULATA: FIG. 1, TYPE, × 2/5; FIG. 2, bud, × 3, from TYPE; FIG. 3, capsule, × 5, from topotype.
Var. VERA: bud, × 3, from New Jersey.

woods and thickets back of sand-beach of James River, below Sunken Meadow Beach, Surry County, August 23, 1938, *Fernald & Long*, no. 9079 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.). SOUTH CAROLINA: rich thicket, North Charleston, July 15, 1927, *Wiegand & Manning*, no. 1632; river-swamp east of Hendersonville, July 20, 1927, *Wiegand & Manning*, no. 1633. MISSISSIPPI: Ocean Springs, 1895, *I. Skehan*. LOUISIANA: old specimen ex herb. Torrey. ILLINOIS: Mt. Carmel, August 6, 1887, *M. B. Waite;* damp thicket, Calamas Lake, Macon County, July 22, 1915, *Clokey*. KANSAS: sandy woods, Pottawatomie County, July 23, 1895, *J. B. Norton*, no. 117. OKLAHOMA: Cherokee Nation, August 19, 1895, *J. W. Blankinship*.

Typical *Apios americana* has the compact and thick raceme strongly rounded at summit (FIG. 3). When mature, with flowers or fruits dropped, the rachis is 3–17 cm. long. In var. *turrigera* the denuded mature rachis is usually 1–2 dm. long. The plants of the latter variety, as well as those of forma *pilosa* Steyermark (1938), will be found in the herbaria under the synonymous names, *Glycine Apios* L. (1753), revived by Britton (1913); *Apios americana* Medikus (1787), revived by Rehder (1934); *A. tuberosa* Moench (1794) and *Apios Apios* (L.) Macmillan (1892). Had those who have devoted much time to juggling the names looked at the material they might have discovered that their names covered at least three different entities! See p. 475.

In PLATE 575, FIG. 1 shows an inflorescence, × 1, of *Apios americana*, var. *turrigera* from the TYPE, Sunken Meadow Beach, Virginia, *Fernald & Long*, no. 9079; FIG. 2, inflorescences, × 1, from east of Hendersonville, South Carolina, *Wiegand & Manning*, no. 1633. FIG. 3 is a characteristic inflorescence, × 1, of typical *A. americana*, from Fishers Island, New York, *St. John*, no. 2761.

PTELEA TRIFOLIATA L. Extending down the James well into the Coastal Plain. PRINCE GEORGE COUNTY: rich alluvial woods and thickets by James River, Upper Brandon, no. 9356. SURRY COUNTY: rich alluvial woods and thickets back of sand-beach of James River, Eastover, no. 8746. See p. 466.

*PONCIRUS TRIFOLIATA (L.) Raf. SURRY COUNTY: a single shrub 1 m. high at border of woods, west of Claremont, no. 9085.

It was surprising to find the Trifoliate Orange, so much employed as a fiercely spiny hedge-shrub farther south, hardy and in open woods of Surry County.

CROTONOPSIS ELLIPTICA Willd. CHESTERFIELD COUNTY: exsiccated sandy woodroad 1½ miles northwest of Ettrick, no. 9358. AMELIA COUNTY: border of argillaceous bog about 1 mile north of Winterham, no. 9090. See p. 474.

Certainly very local. The only Virginian material previously in the Gray Herbarium is from Fairfax County.

*Euphorbia ammanioides HBK. York County: sandy beach, York River, northwest of Yorktown, no. 7510 (distributed as *E. polygonifolia*).

Dr. Louis C. Wheeler calls my attention to this material, collected after dark and mistaken for the common sand-beach *Euphorbia polygonifolia*. It is *Chamaesyce Ingallsii* Small of "sand-dunes, Fla. to Tex."

*E. falcata L. Henrico County: railroad siding west of Elko Station, no. 9093. Previously collected (distributed without identification) in Bath County: along railroad, locally abundant, vicinity of Millsboro, September 17, 1907, *E. S. Steele*.

Both stations are on the Chesapeake and Ohio Railroad. This characteristic European species may be confidently looked for across the state, near this trunk line. See p. 473.

*Callitriche deflexa A. Br., var. Austini (Engelm.) Hegelm. (*C. Austini* Engelm.). Norfolk County: damp road in pine woods east of North Landing, May 6, 1935, *Fernald & Griscom*, no. 4447. Greensville County: fallow argillaceous field and exsiccated pond-hole, north of Skipper's, no. 9968. See p. 490.

Acer Negundo L. Extending down the James to Charles City County: alluvial woods along James River, Harrison Point, no. 9097.

*Parthenocissus quinquefolia (L.) Planch., forma hirsuta (Donn) Fernald in Rhodora, xli. 429 (1939). Prince George County: alluvial woods by Wall's Run, northwest of Garysville, no. 9979.

Vitis vulpina L. (*V. cordifolia* Michx.). See Rhodora, xli. 431 (1939). Rather frequent in rich or alluvial thickets eastward to Surry and Southampton Counties also on the shores of Back Bay in Princess Anne County (many nos.).

V. rotundifolia Michx.

On the wooded alluvial bottomland of Meherrin River, near Haley's Bridge, an area which had been deeply submerged during much of the summer of 1938, long pendulous and branching cord-like roots hung in September and October from trunks and branches 3 m. above the ground. These tough pendulous roots, up to 2.25 m. long, gave the aspect of festoons of *Tillandsia usneoides*.

*Sida rhombifolia L. Southampton County: roadsides and waste places, Courtland, nos. 8765 and 9098.

Extension north from North Carolina. See p. 469.

*Althaea officinalis L. Mathews County: border of brackish marsh near North, no. 8764, a large and thoroughly established colony.

First from south of Long Island. See p. 468.

Hypericum mutilum L., var. **parviflorum** (Willd.), comb. nov. *H. parviflorum* Willd. Sp. Pl. iii^2. 1456 (1803). Less common in southeastern Virginia than typical *H. mutilum*.

The type of *Hypericum mutilum* L., a Clayton plant, is the common southern extreme with the uppermost cauline and the rameal leaves ovate- to lance-deltoid, or gradually tapering from base to blunt summit. Var. *parviflorum* is the wider-ranging and usually more northern plant with all the leaves elliptic and gradually rounded at summit, described by Willdenow "Folia *elliptica obtusa sessilia basi subcordata*". In the South both extremes occur and northward to southern New England, central New York, Ohio, Illinois and Missouri there are some transitions. In northern New England, northern New York, Nova Scotia, New Brunswick, Quebec and the region westward only var. *parviflorum* seems to occur. Typical *H. mutilum* is often very tall, plants 7.5–9 dm. high being not infrequent. Var. *parviflorum* is usually lower and more delicate, though plants 6–7 dm. high occur.

H. Drummondii (Grev. & Hook.) T. & G. Greensville County: disturbed soil of roadside bank, bordering clearing in pine and oak woods near Three Creek, north of Emporia, no. 9378; roadside bordering open thickets and borders of woods southeast of Emporia, no. 9379.

Primarily a species of the interior of the country and of the Gulf States, though occurring locally from Florida to southeastern Virginia. See p. 485.

Lechea racemulosa Michx.—In view of the scarcity of expanded flowers in the genus, it should be recorded that *Lechea racemulosa* was twice found in full anthesis at 10 *A. M.*, the large colonies being uniform in the great profusion of widely expanded flowers, seemingly all on the plant fully open at once! This was in July. In August of 1936, with Mr. Griscom we found *L. minor* thus fully flowering, also at about 10 *A. M.* Perhaps those who have sought the expanded flowers have looked too early in the day.

Viola Stoneana House. To the few recorded stations add one from Greensville County: rich deciduous woods by Metcalf Branch, east of Emporia, no. 9102.

V. lanceolata L., var. vittata (Greene) Weath. & Grisc. To the

recorded stations (in Sussex and Isle of Wight) add one in GREENSVILLE COUNTY: fallow argillaceous field and exsiccated pond-hole, north of Skipper's, no. 9986. See p. 490.

*V. PRIMULIFOLIA L., var. VILLOSA A. Eaton. DINWIDDIE COUNTY: peaty clearing north of Burgess Station, no. 9985. GREENSVILLE COUNTY: sandy plowed field about 1 mile northwest of Dahlia, no. 9755. Seen at other stations.

DIRCA PALUSTRIS L. To the single station reported add others also in SURRY COUNTY: dry wooded slope by College Run, about 1 mile west of Highgate, no. 9988 (no. 9384, labeled as from east of Blizzard's Corners, is from the same station); rich wooded ravine northwest of Bacon's Castle, no. 9758; Mr. George Mason tells us of another station, back of the John Rolf house, between Surry and Scotland. See p. 477.

*LAGERSTROEMIA INDICA L. GREENSVILLE COUNTY: spreading in a bushy clearing at the North Carolina Line, near Fontaine Creek, southwest of Haley's Bridge, no. 9602.

RHEXIA CILIOSA Michx. To the few recorded stations add many in GREENSVILLE and NANSEMOND COUNTIES (many nos.). See p. 472.

EPILOBIUM COLORATUM Muhl. SURRY COUNTY: along rills, gullies in rich beech woods 1½ miles north of Surry.

Certainly very local on the Coastal Plain; collected by Grimes at Williamsburg.

*OENOTHERA FRUTICOSA L., var. **microcarpa**, var. nov. (TAB. 576, FIG. 1 et 2), caule glabro vel supra minute piloso; foliis lineari-lanceolatis glabris vel glabratis repando-dentatis; capsulis longe stipitatis strigoso-pilosis corporibus 3.5–4 mm. longis.—Prince George County, VIRGINIA: argillaceous and siliceous boggy depression about 3 miles southeast of Petersburg, on headwaters of Blackwater River, June 25, 1936, *Fernald, Long & Smart*, no. 5860 (TYPE in Gray Herbarium); similar habitat at head of Poo Run, June 19, 1936, *Fernald, Long & Smart*, no. 5858.

The specimens were distributed under the inclusive name *Oenothera fruticosa;* but now that we have the very illuminating treatment of the subgenus *Kneiffia* by Munz[1] it is apparent that the tiny-fruited plant of the boggy depressions of Prince George County is not accounted for in his treatment. By his statement our plant comes nearest to *Oe. fruticosa*, var. *subglobosa* (Small) Munz of Georgia and Alabama; but that has the capsule (PL. 576, FIG. 3) only minutely puberulent. *Kneiffia arenicola* Small, with capsules as small as in *Oe. fruticosa*, var. *microcarpa*, is described as having densely silvery-silky leaves. PLATE 576, FIG. 1 shows the summit of the TYPE, × 1; FIG. 2 is a

[1] Philip A. Munz: Studies in Onagraceae X. The subgenus Kneiffia (genus Oenothera) and miscellaneous new species of Oenothera. Bull. Torr. Bot Cl. lxiv. 287 et seq. (1937).

capsule, × 5, to show the pubescence. FIG. 3 shows a capsule, × 5, of var. *subglobosa* from Stone Mt., Georgia, *A. H. Curtis*, no. 6472.

*OE. FRUTICOSA L., var. **unguiculata**, var. nov. (TAB. 577, FIG. 1–3), caule 0.5–1 m. alto piloso, pilis copiosis divergentibus; foliis subvelutinis vel pilosis anguste lanceolatis subintegris; calicibus dense pilosis alibastris apicibus liberis subulatis unguiculatis 1–1.5 mm. longis; capsulis clavato-ovoideis valde sulcatis divergente hirsutis corporibus 5–6 mm. longis.—Southeastern Virginia to South Carolina. VIRGINIA: dry pine woods south of Skipper's, Greensville County, May 21 and July 18, 1939, *Fernald & Long*, nos. 9991 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.), and 10,747; peaty and argillaceous swale north of Littleton, May 22, 1939, *Fernald & Long*, no. 9990. SOUTH CAROLINA: low grounds, Columbia, June 16, 1855, *Hexamer & Maier*.

Var. *unguiculata* in its long sepal-tips is quite unlike the other varieties of *Oenothera fruticosa*. As defined by Munz, *Oe. fruticosa* has "sepals . . . with narrow tips up to about 1 mm. long, these not free or, if free, not strongly divaricate." PLATE 577, FIG. 1 shows the TYPE, × ⅖; FIG. 2 is a bud, × 3, showing the dense pubescence and the free unguiculate sepal-tips; FIG. 3, a fruit, × 5, from the TYPE-COLONY (no. 10,747). FIG. 4 is a characteristic full-grown bud, × 3, of *Oe. fruticosa*, var. *vera* Hook., as identified by Munz, from Penn's Grove, New Jersey, *Mary H. Williams*.

*OE. SPECIOSA Nutt. PRINCE GEORGE COUNTY: naturalized in dry open field, Camp Lee, no. 9989. ISLE OF WIGHT COUNTY: spreading on roadside bank southeast of Windsor, no. 10,748.

MYRIOPHYLLUM HETEROPHYLLUM Michx. GREENSVILLE COUNTY: closely filling two small woodland ponds, one about 1 mile north of Skipper's, no. 9798, the other just north of Dahlia, no. 9799, the latter with gigantic fruiting plants with numerous scorpioid branches at the center of the pond, but with more slender sterile plants at the margin (no. 8797), these superficially suggesting *M. pinnatum*.

*M. BRASILIENSE Cambess. (*M. proserpinacoides* Gill.). JAMES CITY COUNTY: abundant in brook in woods south of Williamsburg, no. 8796.

The cultivated "Water Feather," seen in other stations, especially in artificial ponds.

*PROSPERPINACA INTERMEDIA Mackenzie. WARWICK COUNTY: shallow pool in woods, north of Lee Hall, no. 8794.

Very abundant, growing with typical *P. palustris* and *P. pectinata* (the latter not seen by Grimes). See p. 468.

HEDERA HELIX L. PRINCE GEORGE COUNTY: abundantly natural-

ized and heavily flowering, rich alluvial woods and thickets by James River, Upper Brandon, no. 9386.

A very extensive colony, the shrubs climbing high in and choking the trees, the lower and sterile branches with angulate leaves, the upper and fertile with unlobed ovate blades. The "English Ivy," closely embracing the trees of *Bumelia, Celtis, Albizzia* and *Staphylea*, makes a most bizarre forest! See p. 478.

SANICULA CANADENSIS L., var. FLORIDANA (Bickn.) H. Wolff. To the station, already reported, in Isle of Wight County, add one in GREENSVILLE COUNTY: border of dry pine woods about 1 mile south of Skipper's, no. 8800.

S. SMALLII Bickn. Scattered in rich woods, always as a few plants only, from HANOVER to GREENSVILLE and SOUTHAMPTON COUNTIES (many nos.).

CHAEROPHYLLUM TAINTURIERI Hook Range extended north to PRINCE GEORGE COUNTY: base of wooded slope and in waste ground, City Point, no. 9760.

ZIZIA AUREA (L.) Koch. Range extended into western margin of Coastal Plain in SUSSEX COUNTY: bottomland woods, Sappony Creek, west of Stony Creek, no. 9762.

*OXYPOLIS TERNATA (Nutt.) Heller. GREENSVILLE COUNTY: sphagnous bog about 1 mile northwest of Dahlia, nos. 8804, 8906 and 9390.

An extraordinarily rare species, described from somewhere in the Carolinas but seen by Coulter & Rose only from Apalachicola, Florida (there fruiting in November). In the representation at the New York Botanic Garden and in the Gray Herbarium the following (besides the abundant material from Apalachicola) are represented: one additional station in northern Florida; one in southern Georgia; two in southeastern North Carolina. When first noticed near Dahlia (in the bog carpeted with *Burmannia biflora*) only young leaves were found; on September 18 the few plants were flowering, on October 12 the petals were dropping; but on December 31, with ice over the bog, Mr. and Mrs. Correll, Mr. Long and I could find no sign that it had fruited. The young carpels had apparently shriveled without maturing, presumably from the absence of the right insect to insure pollination. See pp. 472, 485, 491 and MAP 8.

THASPIUM TRIFOLIATUM (L.) Gray. See Fernald in RHODORA, xli. 442 (1939). Scattered stations in woods and thickets, HENRICO COUNTY to GREENSVILLE and SOUTHAMPTON COUNTIES (many nos.).

RHODODENDRON ARBORESCENS (Pursh) Torr. SOUTHAMPTON COUNTY: wet woods, Assamoosick Swamp, south of Sebrell, nos. 10,010,

10,361 (3.2 m. high); sphagnous swampy woods southwest of Applewhite Church, no. 10,362. ISLE OF WIGHT COUNTY: swampy woods bordering pine barrens, south of Zuni, no. 8808 (3 m. high). NANSEMOND COUNTY: woods and thickets, depressions in pine barrens, east of Cox Landing, south of South Quay, no. 10,762.

Characteristic of wet woods and thickets, especially in the depressions of pine barrens. Usually supposed to be restricted to the region of the Blue Ridge and the Alleghenies, Rehder (Rehder & Wilson, Mon. Azaleas, 167 (1921)) saying it is "distinctly a species of the Appalachian Mountain region and does not occur in the coastal plane [plain] but along the Susquehanna it descends to the southern part of Lancaster County, Pennsylvania, along the Potomac to Fairfax County, Virginia," etc.

KALMIA ANGUSTIFOLIA L., var. CAROLINIANA (Small) Fernald. Range extended inland to SOUTHAMPTON COUNTY: wooded swamp about 7 miles south of Franklin, no. 10,002. NANSEMOND COUNTY: white sand of pine barrens, southwest of South Quay, no. 10,366. See p. 490.

*LEUCOTHOE RACEMOSA (L.) Gray, var. **projecta**, var. nov. (TAB. 578, FIG. 1 et 2), racemis plerumque 0.6–2 dm. longis, rhachi glabro; ramulis glabris vel deinde glabratis.—Southeastern Virginia to Georgia and eastern Tennessee. VIRGINIA: margin of pool in pine woods east of Little Creek, Princess Anne County, May 4, 1935, *Fernald & Griscom*, no. 4481; swampy woods near Steere's Pond, northeast of Burgess Station, May 19, 1939, *Fernald & Long*, no. 10,003 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.). NORTH CAROLINA: low oak-pine woods, 4 miles east of Bolton, Columbus Co., July 5, 1927, *Wiegand & Manning*, no. 2383; swampy woods, southeast of Maysville, April 17, 1933, *J. M. Fogg, Jr.*, no. 5545; cypress swamp near Wilmington, April 23, 1923, *Churchill*. SOUTH CAROLINA: Waccaman River swamps near Bull Creek, Horry County, April 22, 1932, *Weatherby & Griscom*, no. 16,613; near Beaufort, May 5, 1917, *Churchill;* Porcher's Bluff, Christ Church Parish, Charleston County, April 16, 1911, *E. A. Mearns*, no. 69. GEORGIA: dry white sand south of Open Pond, Decatur County, August 13, 1901, *Harper*, no. 1217. TENNESSEE: border of woods, Wolf Creek, May 15, 1900, *Ruth*, no. 191.

Var. *projecta*, when well developed, has amazingly longer racemes than typical *Leucothoë racemosa* (based on *Andromeda racemosa* L., from eastern Pennsylvania), the wide-spread and northern shrub (FIG. 3) having them 2–5 (rarely –7) cm. long. Var. *projecta*, likewise, tends to have larger flowers, but I can find no morphological characters to separate them.

Var. *projecta* has recently been included by Small in *Leucothoë elongata* Small in Bull. N. Y. Bot. Gard. i. 284 (1899) when, in his Manual, he treated it as *Eubotrys elongata* with the range "Acid swamps and sandhill ponds, Coastal Plain, Fla. to La. and S. Va." Originally *L. elongata* was described only from Florida, the characteristic shrub, occurring from Georgia and Florida to Louisiana, with closely pilose branchlets and rachises and with ciliate sepals (FIG. 4). So far as I can make out the latter shrub has no other characters to separate it from the glabrous long-racemed variety of southeastern Virginia and even from the short-racemed typical *L. racemosa.* Dr. Britton apparently balked at making a transfer of it. Treating *Leucothoë racemosa* in Ill. Fl. ed. 2, as *Eubotrys racemosa* (good old *Leucothoë,* § *Eubotrys* Gray), he said "**Leucothoë elongata** Small, of the Southern States, is of this genus . . . as far north as Virginia"; but, although placing *L. racemosa* under *Eubotrys,* Britton kept *L. elongata* as *Leucothoë*! I am calling it

LEUCOTHOË RACEMOSA (L.) Gray, var. **elongata** (Small), comb. nov. *L. elongata* Small in Bull. N. Y. Bot. Gard. i. 284 (1899). *Eubotrys elongata* Small, Shrubs of Florida, 95, 133 (1913).—Georgia and Florida to Louisiana. PLATE 578, FIG. 4, portion of raceme, × 5.

In PLATE 578, FIG. 1 is a characteristic inflorescence, × 1, of the type of *Leucothoë racemosa,* var. *projecta;* FIG. 2, flowers and a portion of the glabrous rachis, × 5, from the TYPE; FIG. 3, a characteristic inflorescence, × 1, of typical *L. racemosa* from the general type-region, Hammonton, New Jersey, *Wm. Bassett;* FIG. 4, flowers and portion of the pilose rachis, × 5, of var. *elongata* from north of Aucilla, Jefferson County, Florida, *Griscom,* no. 21,482.

BUMELIA LYCIOIDES (L.) Gaertn. f., var. VIRGINIANA Fernald in RHODORA, XXXVIII. 439 (1936). PRINCE GEORGE COUNTY: rich alluvial woods and thickets by James River, Upper Brandon, no. 9396.

At this point the endemic *Bumelia* of southeastern Virginia is very abundant, making a striking feature of the alluvial thicket, the small and (in September, 1938) heavily fruiting trees reaching a height of 4.5 m., with trunks up to 1.5 dm. in diameter. See p. 478.

STYRAX AMERICANA Lam. To the very few known stations in Virginia add the following. HENRICO COUNTY: swampy thicket bordering Whiteoak Swamp, south of Elko Station, no. 9394. SOUTHAMPTON COUNTY: swampy woods along Nottoway River, below Point Beach, south of Franklin, abundant, no. 10,780. NANSEMOND COUNTY: low sandy woods along Blackwater River, George's Bend, south of South Quay, no. 10,781, abundant. See p. 478.

Photo. W. H. Hodge

LEUCOTHOE RACEMOSA: FIG. 3, inflorescence, × 1, from New Jersey.
Var. PROJECTA: FIG. 1, portion of TYPE, × 1; FIG. 2, portion of raceme, × 5, from TYPE.
Var. ELONGATA: FIG. 4, portion of raceme, × 5, to show pilose rachis, pedicels, etc., from Florida.

Photo. W. H. Hodge

GENTIANA STONEANA: FIG. 1 TYPE, × 2/5; FIG. 2, flower, × 1.

*Gentiana cherokeensis (W. P. Lemmon) Fernald in Rhodora, xli. 487 (1939). Sussex County: moist argillaceous pineland ("flat pineland") about 2 miles east of Stony Creek, nos. 9617, 9685. See pp. 486, 487 and map 14.

Very distinct from *Gentiana Saponaria* L. in its linear-lanceolate leaves and its longer and stiffly erect calyx-lobes, as well as in the deeper-blue corolla with conspicuous darker longitudinal bands. The only station known north of northwestern Georgia.

G. Catesbaei Walter, Fl. Carol. 109 (1788). Described in the brief phrase under the group with campanulate ventricose corollas, *G. Catesbaei* was further defined only by the brief "corollis extus caeruleis, foliis lanceolatis remotis," as contrasted with *G. Saponaria* sensu Walter, not Linnaeus, which was defined "corollis viridescentibus, foliis ovatis trinerviis". The latter, of course, was the greenish-flowered *G. villosa* L., whereas, as shown by a photograph kindly sent me by Mr. Ramsbottom of the only gentians in the Walter herbarium, his *G. Catesbaei* covered both a plant suggesting *G. Saponaria* L. in the strict sense and *G. Elliottii* Chapman, which, because of the earlier *G. Elliottea* Raf., has been passing as *G. parvifolia* (Chapm.) Britton. Asa Gray, not recognizing the latter species, treated Walter's *G. Catesbaei* as identical with *G. Saponaria*. Since Walter's material contained both a plant similar to the Linnean *G. Saponaria* and the plant with open-campanulate erect corollas subsequently called *G. Elliottii* Chapman and *G. parvifolia* (Chapm.) Britton, I am taking up the name G. Catesbaei Walter for the latter southeastern species, thus following the earlier treatments.

G. **Stoneana**, sp. nov. (tab. 579), perennis pergracilis; caulibus solitariis vel paucis teretibus glabris 2–6 dm. longis arcuatis vel suberectis simplicibus vel 2–3-furcatis; foliis angustissime linearibus vel lineari-oblanceolatis crassis, 7–15-jugis; floribus pedunculatis linearibracteatis vel nudis; calicis lobis foliis superioribus valde similibus; corollis intense azureis vel indicis tubo obconicis intus brunneo-maculatis, limbo valde patentibus vel rotatis, lobis ovatis vel late oblongis 1.3–2 cm. longis plica multifida duplo longioribus.—Pine barrens of New Jersey and locally from southeastern Virginia to South Carolina. Type: siliceous and argillaceous thicket north of Factory Hill, Nansemond County, Virginia, *Fernald & Long*, no. 9611 (in Herb. Gray; isotype in Herb. Phil. Acad.).

Gentiana Stoneana is the exquisite species which erroneously passes as *G. Porphyrio* J. F. Gmelin. It was described from South Carolina as *G. angustifolia* Michx. Fl. Bor.-Am. i. 177 (1803) and under that

name it was known to Grisebach and to Gray (Synoptical Flora), but Michaux's name can not now be maintained because of the earlier *G. angustifolia* Vill. (1787). The name *G. Porphyrio* J. F. Gmelin was cited by Grisebach in its synonymy and, since its adoption in Britton & Brown and in Gray's Manual, ed. 7, in place of *G. angustifolia*, has become very firmly established. Gmelin never saw the plant and certainly did not newly describe it. He merely gave a substitute name for *G. purpurea* Walter, not L. Walter's *G. purpurea* was very briefly and vaguely described. He had three species of *Gentiana:* two under the section "corollis campanulatis ventricosis" (his *G. Saponaria*, which was *G. villosa* L., and his *G. Catesbaei*, which was partly *G. Elliottii*, as above pointed out); and under "Corollis infundibuliformibus" his

purpurea 3. corollis intus laete purpureis; caule simplici, fol. linearibus.

The only species of *Gentiana* represented in Walter's herbarium are, as indicated by me under the discussion of *G. Catesbaei*, mere fragments of the latter, of *G. villosa* L. (*G. Saponaria* sensu Walt., not L.) and of something resembling true *G. Saponaria*. There is nothing resembling *G. Stoneana* (*G. angustifolia* Michx., not Vill.). Whether the latter occurs in Walter's territory is doubtful; I have seen none from there in the herbaria examined; and certainly the description of the corolla as infundibuliform and bright purple within could not have been applied to *G. Stoneana* with intense blue corolla with brown speckling on the inside of the obconic tube and with conspicuous rotate limb. Among the unsettled species of *Gentiana* which Long and I have found in Southampton County, Virginia is one with narrowly lanceolate to linear leaves and purple-violet to crimson or "rose-purple" infundibuliform corollas. It is also in the Gray Herbarium from Beaufort County, South Carolina; and I have seen it at the New York Botanical Garden from eastern North Carolina. It has erroneously passed as the prairie species, *G. puberula* Michx. It certainly is not that, but whether it is *G. purpurea* Walt. must await further study. It is highly probable that it is. At any rate, I find myself quite incapable of believing, when Walter described a plant with infundibuliform corolla lively purple within, that he referred to a plant with rotate azure- or indigo-blue flower. As stated, *G. Porphyrio* was merely a substitute-name given by Gmelin to replace *G. purpurea* Walt., which he did not know, but the name obviously referred to the conventional purple of porphyry-

Whatever *G. purpurea* is *G. Porphyrio* is the same. In view of the occurrence in Walter's area of a little known gentian with narrow leaves and truly infundibuliform purple corollas it is only right, in the absence of a preserved type, to suppose that Walter had such a plant. Its status as a species awaits fuller material and more critical study.

Gentiana Stoneana I name with great pleasure for the distinguished student of the Pine Barrens of New Jersey, the late WITMER STONE. Stone's keen appreciation of this plant was vividly shown in his following brief comment: "It is probably a matter of individual preference to determine which gentian is the handsomest. The present species, found only in the remote sections of the Pine Barrens, is certainly the least known and to my mind as handsome as any. Its flaring mouth, the delicate markings within, and the intensity of the blue, make it one of the choicest blooms of the region"—Stone, Pl. So. N. J. 640. No plant could more appropriately commemorate Witmer Stone than this retiring and distinguished gentian, with its flowers of true blue.[1]

In RHODORA, xxxix. 364 and 444 (1937) I recorded finding *Gentiana* "*Porphyrio*" south of Factory Hill, Nansemond County, Virginia. The road there has no state boundaries indicated and retravel of it shows that our station was actually within Gates County, North Carolina. Our no. 6852, as well as fuller material collected in October, 1938 (no. 9612) should be indicated as from "border of moist argillaceous pine and oak woods 1½ miles northeast of Dort School, Gates County, North Carolina." See p. 487.

PLATE 579 shows as FIG. 1 a couple of plants, × ⅖, the TYPE of GENTIANA STONEANA. FIG. 2 is a flower, × 1.

AMPELAMUS ALBIDUS (Nutt.) Britton (*Gonolobus laevis* sensu Vail, not Michx.). See Perry in RHODORA, xl. 286 (1938). HENRICO, PRINCE GEORGE and SURRY COUNTIES: rich alluvial woods and thickets (many nos.). See p. 475 and MAP 10.

PHACELIA DUBIA (L.) Trel. To the single Coastal Plain station (in Greensville County) add others in SOUTHAMPTON, SUSSEX and DINWIDDIE COUNTIES (several nos.). See p. 489.

In eastern Virginia *Phacelia dubia* is one of the indigenous weeds and ruderals, springing up early (flowering from early April into May) in fields, roadsides and waste places and becoming mostly dried and unrecognizable by June.

[1] The smaller white-flowered species of Florida is GENTIANA **tenuifolia** (Raf.), comb. nov. *Diploma tenuifolia* Raf. Fl. Tell. iii. 27 (1837). *Dasystephana tenuifolia* (Raf.) Pennell in Bull. Torr. Bot. Cl. xlvi. 183 (1919).

Hydrolea quadrivalvis Walt. Range extended north from the southernmost counties to Chesterfield County: margin of exsiccated old millpond in Swift Creek, Lakeview, no. 9413. See p. 477.

*Myosotis macrosperma Engelm. Prince George County: rich deciduous woods, Coggins Point, no. 10,016; alluvial woods by Wall's Run, northwest of Garysville, no. 10,017. Surry County: alluvial woods along Gray's Creek, west of Old Courthouse Corners, no. 10,018; border of cypress swamp along College Run, about 1 mile west of Highgate, no. 10,019.

Although treated in Gray's Man., ed. 7 merely as a trivial variety, var. *macrosperma* (Engelm.) Fernald, of *Myosotis virginica*, that disposition is not justified. True *M. macrosperma*, characteristic in southeastern Virginia of the rich calcareous soils of the Miocene fossil-beds south of the James and found by us nowhere else, is sharply defined as a species. Its disagreeable habit of maturing its fruits in two or three days and conferring them (in the glochidiate-bristly large calices) upon the clothes of passing intruders is a character not conspicuous in *M. virginica* of thin and sterile soils. See p. 493.

Physalis monticola C. Mohr. To the first Virginian station (in Southampton County) add two in Dinwiddie County: borders of dry oak and pine woods north of Burgess Station, no. 10,021; dry hickory and oak woods 2–3 miles east of Dinwiddie, no. 10,022.

*Linaria canadensis L., var. texana (Scheele) Pennell. Dinwiddie County: sandy fields and clearings southwest of Petersburg, no. 10,023.

A characteristic southern extreme but in Virginia (as about Charleston, South Carolina, where we watched it in April) with a perfectly continuous series connecting the extreme large-flowered plants with the very small-flowered typical *L. canadensis*. There is no good reason to call the innumerable transitional specimens hybrids of two distinct species, as Pennell has recently implied (Scroph. E. Temp. N. Am. 302). His original treatment showed better understanding of the plants. If the species hybridize so freely that most specimens in an old field are intermediates the value of the two extremes as distinct species is nullified. The seeds, like the flowers, are quite inconstant. See p. 490.

*Chaenorrhinum minus (L.) Lange (*Linaria minor* (L.) Desf.). Henrico County: railroad cinders, Elko Station, nos. 8842, 9137. Dinwiddie County: similar habitat, Petersburg, nos. 10,813, 10,814. See p. 473.

Pennell, l. c. 318, had seen (in 1935) no material from south of Pennsylvania.

SCROPHULARIA MARILANDICA L. To the single Coastal Plain station (in Sussex County) reported add others in SOUTHAMPTON and DINWIDDIE COUNTIES (various nos.).

(To be continued)

LAST SURVIVORS IN THE FLORA OF TIDEWATER VIRGINIA

M. L. Fernald

(*Continued from p. 559*)

Veronica Anagallis-aquatica, forma anagalliformis (Boreau) G. Beck (*V. glandifera* Pennell). Spring-heads, ditches and pools, various stations in James City, Surry and Nansemond Counties (many nos.). Plates 580 and 581.

I have studied for many days the series of circumboreal material of *Veronica Anagallis-aquatica*, vainly striving to find the two endemic American species, *V. glandifera* Pennell in Torreya, xix. 170 (1919) and *V. connata* Raf. Med. Fl. ii. 110 (1830) or *V. catenata* Pennell in Rhodora, xxiii. 37 (1921), maintained by Pennell. It seems to me that many specimens of American *V. glandifera* (pl. 580, figs. 1, 3 and 5; pl. 581, figs. 1, 4 and 6) are quite inseparable from the plants of European *V. Anagallis-aquatica* (or *V. Anagallis* of most European authors) with a few glandular hairs in the inflorescence (pl. 580, figs. 2, 4 and 6; pl. 581, figs. 2 and 5); and certainly, if the few glands are discounted, it is to me quite impossible to separate material from the type-region (vicinity of Suffolk, Virginia, pl. 581, fig. 6) from a large series of typical European and Asiatic *V. Anagallis-aquatica*. The differences between *V. Anagallis-aquatica* and *V. glandifera* given by Pennell are as follows:

> "E. Stems distally, rachis, and pedicels glabrous or nearly so; sepals acute to slightly acuminate; style 1.5–3 mm. long; leaf-blades oblong-ovate, mostly widest about the middle, slightly serrate to nearly entire. . . . . 17. *V. anagallis-aquatica.*
>
> EE. Stems distally, rachis, and pedicels pubescent with gland-tipped hairs; sepals strongly acuminate; style 1–1.5 mm. long; leaf-blades lanceolate or broadly lanceolate, widest near the base, usually more strongly serrate. 18. *V. glandifera.*"

In Europe, however, *Veronica Anagallis-aquatica* (or *V. Anagallis*)

is well known to have a variation of leaf-outline from oblong-ovate to lanceolate: "Folia oblongo-ovata vel lanceolata, acuta denticulata vel subintegerrima"—Hayek in Fedde, Repert. Beih. xxx². 173 (1929); "Blätter . . . lanzettlich bis länglich, . . . gezähnt"—Römpp in Fedde, Repert. Beih. l. 159 (1928). In fact, the European students of *Veronica* consider the presence of glands in the inflorescence of no great taxonomic significance: "Kommt hin und wieder auch mit drüsenhaariger Traube vor = f. *anagalliformis* [Boreau Fl. du centr. de la France ed. 3, II 489]"—G. Beck, Fl. Nied.-Österr. ii. 1051 (1903); "Am meisten variabel ist die B e h a a r u n g . Auser den kahlen kommen in manchen Gegenden glandulöse Formen vor, die kahlstengelig, aber innerhalb der Infloreszenz ± drüsig sind: *f. anagalliformis* (Boreau . . .) Beck."—Schuster, *Unsere Wasserehrenpreise* in Mitteil. Bayer. Bot. Gesells. i. 537, 538 (1906).

Pennell feels that true *Veronica Anagallis-aquatica* with glabrous inflorescences is only "Naturalized from Eurasia"[1] in its broad North American range, because the earliest collection was made in 1883; but the form with some glands in the inflorescence (his *V. glandifera*) he considers an endemic and indigenous species of the eastern United States: "This was collected by Clayton in Virginia before 1739 . . . ; such an early date confirms the distributional evidence that *V. glandifera* is an indigenous species."[2] Only 17 pages before we are told by him of *V. arvensis*, which may occur "on cliffs and in open woods," that for it "Linnaeus cited other works back to . . . 1623, and among these were Gronovious and Colden; the latter showed the plant's early introduction to New York, and the former (Gronov., Fl. Virg. 4. 1739), based upon Clayton's number 369 . . . shows similar early introduction to Virginia." In the type-region, near Suffolk, Virginia, the glandular American form of *V. Anagallis-aquatica* (i. e. *V. glandifera*) occurs in ditches by the railroad; at its Surry County stations it is in the man-made wells at springheads on old plantations or in rills with European Water Cress and the introduced *Potamogeton crispus;* near Williamsburg it fills an artificially dammed stream or small pond, along with such obviously introduced species as the cultivated South American *Myriophyllum brasiliense* (*M. proserpinacoides*) and the European and generally cultivated Water Cress.

[1] Pennell, Scroph. E. Temp. N. A. (Acad. Sci. Nat. Phil. Mem. i.), 363 (1935)
[2] Pennell, l. c. 364 (1935).

The second species, similar to *Veronica Anagallis-aquatica* in having sessile cauline leaves, is the plant (PL. 582 and 583) which differs from it in having fewer (5–35)-flowered racemes with more loosely and horizontally divergent pedicels; the smaller corolla roseate to white (instead of larger and bluish-lilac); the round-reniform or broadly obcordate deeply notched capsules mostly longer than the blunt or merely acutish lance-oblong or narrowly ovate sepals. This, like *V. Anagallis-aquatica*, may be either glabrous throughout or more or less glandular at summit or in the inflorescence. It has been treated by Pennell as an endemic North American species, ranging across the continent, from New England and southern Quebec to the Pacific, and southward to southern Pennsylvania, Tennessee, Missouri, Oklahoma, New Mexico, Arizona and southern California. the glabrous form mostly western, the glandular one mostly eastern. The glabrous plant is *V. catenata* Pennell in RHODORA, xxiii. 37 (1921); the glandular one *V. catenata glandulosa* (Farwell) Pennell, l. c. (1921), based on *V. Anagallis-aquatica*, var. *glandulosa* Farwell in Rep. Mich. Acad. Sci. xix. 249 (1917). In his later study[1] Pennell takes up for the American series which he had called *V. catenata* the very incorrectly or erroneously described and wholly doubtful *V. connata* Raf. Med. Fl. ii. 110 (1830), which was said by its author to be close to *V. scutellata*, and which was assigned perfoliate and entire leaves such as are not found in our plant. Pennell recognized that Rafinesque's account lacked absolute clarity, but he felt "that we must replace the name of *V. catenata* by *V. connata;* it is regretfully that I do so because the latter name is actually, though not obviously, a misnomer."

It seems to me from close comparison of specimens that there is no need to take up for the plant under consideration the very doubtful *V. connata* Raf.; neither is *V. catenata* Pennell required for it. I am quite incapable of separating the American series (PL. 582, FIG. 1; PL. 583, FIGS. 1 and 3) from the Eurasian series (PL. 582, FIG. 2; PL. 583, FIGS. 2 and 4) which is there regularly passing as *V. aquatica* Bernh. Über Beg. Pflanzen. Art. 66 (1834). Since arriving at this conclusion after several days of close comparison I find that the same decision was earlier reached by Römpp in his study of the world-wide genus *Veronica*, "*Die Verwandtschafts-verhältnisse in der Gattung Veronica*," in Fedde, Repert. Beih. l. (1928). Here are Römpp's words: "Soviel sich der Originaldiagnose entnehmen lässt, scheint *V. catenata* Pennell

[1] Pennell, Scroph. E. Temp. N. Am. (Acad. Nat. Sci. Phil. Mon. i.), 364–370 (1935).

mit *V. aquatica* Bernh. identisch zu sein . . . *V. catenata glandulosa* (Farwell) Pennell würde, falls sich die oben angedeutete Vermutung beim Vergleich von Originalmaterial bestätigen lassen solte, der drüsigen Varietät *V. Anagallis* (= *V. aquatica*) var. *glandulosa* Čelak. der alten Welt entsprechen." (pp. 162, 163). Pennell, l. c. 329, refers to Römpp's "comprehensive paper on relationships in the Genus Veronica"; but he still maintains the American material as an endemic species.

Unfortunately, the name *Veronica aquatica* Bernh. (1834), the name used by Römpp, by Hayek, by Beck von Mannagetta and, apparently, by all modern European botanists, is a later homonym and, therefore, cannot be held. It is antedated by *V. aquatica* S. F. Gray, Nat. Arr. Brit. Pl. ii. 306 (1821). The latter name is illegitimate because an absolute substitute for *V. Anagallis-aquatica* L. (1753); but, since those who felt (and still feel) that illegitimate names should have no power to invalidate later legitimate but identical names, were overruled at Cambridge in 1930; and since the International Rules (Art. 61) state that: "Even if the earlier homonym is illegitimate . . . the later homonym must be rejected," it is obvious that *V. aquatica* Bernh. cannot be maintained. Römpp cites several binomials under it. The earliest of these is *V. tenerrima* F. W. Schmidt in Mayer, Sammlg. Phys. Aufs. i. 198 (1791), a very questionable plant, which has been referred, in each case with seeming finality, to all three species, *V. Beccabunga* L., *V. Angallis-aquatica* L. and *V. aquatica*! Schuster's discussion of it is to the point:

Zu aquatica gehört nach Originalen auch *V. anagallis var. anagalloides C. Koch* teste Trautvetter (Herb. horti Petropolitani). Eine schwankende Stellung in der Literatur nimmt *V. tenerrima Schmidt Fl. boëm. 1793, I, 14* ein. Reichenbach (1862) wusste mit ihr nichts anzufangen. Beck (1893) stellte sie zu V. beccabunga, Ascherson (1898) zu der Landform von V. anagallis. Nach einem Originalexemplar (Comm. Kitaibel HRM) ist die Pflanze Schmidts eine in allen Teilen kleinere, oft wenigblütige, ca. 20 cm hohe Varietät von V. aquatica. Auf der Originaletikette bemerkt Schmidt: „An varietas sit Anagallidis, adhunc dubito, donec cultura decidat." Da sie Schmidt 1793 in seiner Flora boëmica als Art aufnahm, scheint sie sich samenbeständig gehalten zu haben. Wegen der ganzrandigen teilweise kurz gestielten unterem Blätter hielt sie Beck vermutlich für eine Form von beccabunga, aber alle Merkmale, namentlich auch der vierkantige Stengel, sprechen für aquatica.[1]

From this account the undesirability of taking up for the circum-

[1] Schuster in Mitteil. Bayer. Bot. Gesells. i. 538 (1906).

boreal *Veronica aquatica* the very doubtful *V. tenerrima* is apparent. Very similarly, *V. acutifolia* Gilib. Exercit. i. 119 (1792) is taken up unequivocally by Jávorka, Magyar Fl. 996 (1895) in place of *V. aquatica* Bernh., but Römpp as unequivocally puts it into the synonymy of *V. Anagallis-aquatica!* Its exact identity now becomes very important to make out. Passing *V. connata* Raf., which is surely very doubtful and with no authentic material known, we come to *V. salina* Schur, Enum. Pl. Transsylv. 492 (1866), with "Caule erecto, 2 ped. et altior. . . Foliis anguste lanceolatis, . . . amplexicaulibus, . . . margine glanduloso-serrato-dentatis. Floribus minimis . . . Rachi, pedunculis calycibusque parce glanduloso-pilosis. Corollis rubellis calycem aequantibus. Calycis laciniis . . . oblongis obtusiusculis." This is a good account of *V. aquatica* Bernh.; and Schuster, as well as Römpp, placed *V. salina* in the unquestioned synonymy of *V. aquatica*. So far as I can make out the earliest clear and valid name for *V. aquatica* Bernh. (later homonym) is *V. salina* Schur. There are doubtless those who will champion the very vague *V. tenerrima* and the untypified and inaccurately described *V. connata* as against the clearly described and well understood *V. salina*. Personally I prefer a basis of some security rather than one of perpetual insecurity. Until it is shown that I am in error (and this note will call forward corrections if they are needed) I am taking up V. SALINA Schur for the illegitimate *V. aquatica* Bernh.

Typical *Veronica salina* was the form with more or less glandular inflorescence. It includes the following named forms:

V. SALINA Schur, Enum. Pl. Transsyl. 492 (1866). *V. Anagallis*, var. *glandulifera* Čelak. in Oest. Bot. Zeitschr. xxvii. 165 (1877). *V. aquatica*, forma *glandulifera* (Čelak.) G. Beck, Fl. Nied.-Österr. ii. 1051 (1893). *V. Anagallis-aquatica*, var. *glandulosa* Farwell in Rep. Mich. Acad. Sci. xix. 249 (1917). *V. catenata glandulosa* (Farwell) Pennell in RHODORA, xxiii. 37 (1921). *V. connata typica* sensu Pennell, Acad. Nat. Sci. Phila. Mon. i. 365 (1935), perhaps not *V. connata* Raf. (1830) which was described as glabrous and with perfoliate and entire leaves.

The wholly glabrous form is

V. SALINA Schur, forma **laevipes** (G. Beck), comb. nov. *V. aquatica* Bernh. Über Beg. Pflanzen Art. 66 (1834), not S. F. Gray (1821). *V. aquatica*, forma *laevipes* G. Beck., Fl. Nied.-Österr. 1051 (1893). *V. catenata* Pennell in RHODORA, xxiii. 37 (1921). *V. connata glaberrima* Pennell, Acad. Nat. Sci. Phila. Mem. i. 368 (1935).

Photo. W. H. Hodge

VERONICA ANAGALLIS-AQUATICA, forma ANAGALLIFORMIS (*V. glandifera*): FIG. 1, branch, × 1, from Virginia; FIG. 2, young branch, × 1, from Ireland; FIG. 3, fruits, × 8, from Virginia; FIG. 4, fruits, × 8, from Ireland: FIG. 5, fruit, × 8 from Virginia; FIG. 6, fruit, × 8, from Switzerland.

Photo. W. H. Hodge

VERONICA ANAGALLIS-AQUATICA: FIG. 3, fruit, × 8, from Italy.
Forma ANAGALLIFORMIS (*V. glandifera*): FIG. 1, branch, × 1, from Virginia; FIG. 2, young branch, × 1, from Sweden; FIG. 4, fruit, × 8, from Virginia; FIG. 5, fruit, × 8, from Sweden; FIG. 6, fruit, × 8 from type-locality of *V. glandifera*, near Suffolk, Virginia.

EXPLANATION OF PLATES 580–583.

PLATE 580. VERONICA ANAGALLIS-AQUATICA L., forma ANAGALLIFORMIS (Boreau) G. Beck (*V. glandifera* Pennell): FIG. 1, branch, × 1, of *V. glandifera* (det. *Pennell*) from near Williamsburg, Virginia, *Grimes*, no. 4587; FIG. 2, young branch, × 1, from Stradbally, Queens County, Ireland, *John Ball;* FIG. 3, fruit, × 8, of *V. glandifera* from near Williamsburg, Virginia, *Fernald & Long*, no. 8847; FIG. 4, fruit, × 8, from Newbridge Mt. Bellew, Galway, Ireland, July 17, 1906, *Bowers;* FIG. 5, fruit, × 8, from *V. glandifera* (det. *Pennell*), from Round Top Mountain, Smyth Co., Virginia, alt. 3000 ft., July 2, 1892, *J. K. Small;* FIG. 6, fruit, × 8, from entre Marin et Thielle, Switzerland, *Godet.*

PLATE 581. VERONICA ANAGALLIS-AQUATICA L.: FIG. 3, fruit, × 8, from fossis propre pagum Fratta, Venetia, *Pampanini* in Fl. Ital. Exsicc., no. 149; V. ANAGALLIS-AQUATICA, forma ANAGALLIFORMIS (Boreau) G. Beck: FIG. 1, branch of *V. glandifera* from Eastover, Virginia, *Fernald & Long*, no. 8845; FIG. 2, tip of branch from Gotland, Sweden, July 25, 1924. *T. M. Fries;* FIG. 4, fruit, × 8, of *V. glandifera* from Round Top Mt., Smyth Co., Virginia, July 2, 1892, *J. K. Small;* FIG. 5, fruit, × 8, from Sweden (same specimen as FIG. 2); FIG. 6, fruit, × 8, of *V. glandifera*, from type-locality, near Suffolk, Virginia, *Fernald & Long*, no. 8846.

PLATE 582. VERONICA SALINA Schur, forma LAEVIPES (G. Beck) Fernald (*V. aquatica* Bernh., forma *laevipes* G. Beck; *V. catenata* Pennell): FIG. 1, branch, × 1, of *V. catenata* (det. *Pennell*), from Alviso, Santa Clara County, California, *C. F. Baker*, no. 1700; FIG. 2, branch, × 1, of *V. salina*, forma *laevipes* from Bavaria, *Fl. Exsicc. Bav.* no. 460.

PLATE 583. VERONICA SALINA (*V. catenata*, subsp. *glandulosa* (Farw.) Pennell) and forma LAEVIPES (*V. catenata* Pennell): FIG. 1, branch, × 1, of *V. catenata* subsp. *glandulosa* (det. *Pennell*) from Starke County, Indiana, *Deam*, no. 42,185; FIG. 2, branch, × 1, of *V. aquatica* Bernh. (not S. F. Gray) from Lower Austria, *Braun & Rechinger* in Fl. Exsicc. Austr.-Hung., no. 2620; FIG. 3, fruit, × 8, from Hot Springs, Fall River County, South Dakota, *E. J. Palmer*, no. 37,432; FIG. 4, fruit, × 8, of *V. aquatica* from same specimen as FIG. 2.

VERONICA DIDYMA Ten. PRINCE GEORGE COUNTY: weed in old yard by James River, City Point, no. 9779.

VERONICASTRUM VIRGINICUM (L.) Farwell. SUSSEX COUNTY: border of moist woods south of Stony Creek, no. 9142. GREENSVILLE COUNTY: rich deciduous woods by Metcalf Branch, east of Emporia, no. 9143.

Pennell, l. c., map 86, indicates no Atlantic Coastal Plain stations from south of New Jersey.

SEYMERIA CASSIOIDES (Walt.) Blake. To the original Virginian stations (in Isle of Wight and Greensville Counties) add others in SUSSEX and NANSEMOND COUNTIES (several nos.). See p. 485.

BUCHNERA AMERICANA L. To the single Coastal Plain Virginian station (in Prince George County) reported in 1937 add others in DINWIDDIE and GREENSVILLE COUNTIES (several nos.). See p. 469.

UTRICULARIA JUNCEA Vahl. GREENSVILLE COUNTY: shallow rill in sphagnous bog about 1 mile northeast of Dahlia, nos. 9149 and 9629.

Beautiful material, up to 5 dm. high. See pp. 472, 485.

U. VIRGATULA Barnhart. GREENSVILLE COUNTY: with the last, nos. 9435 and 9628. See MAP 12 and p. 485.

Much later and decidedly lower (0.7–2 dm. high) than the larger-flowered *U. juncea*, with which it grows.

RUELLIA STREPENS L. PRINCE GEORGE COUNTY: swampy woods, bottomland of Powell's Creek, Garsyville, nos. 8472, 8854. CHARLES CITY COUNTY: alluvial woods along James River, Harrison Point, no. 9150.

Our only Coastal Plain stations; but it was found by Grimes in James City County.

*DICLIPTERA BRACHIATA (Pursh) Spreng. SOUTHAMPTON COUNTY: wooded alluvial bottomland of Meherrin River, near Haley's Bridge, nos. 8474, 9437 and 9438.

A slight extension northward, Pursh's type having come from the Roanoke River in North Carolina. See p. 486.

*PLANTAGO INDICA L. (*P. arenaria* Waldst. & Kit.). CAROLINE COUNTY: railroad gravel southeast of Guinea, no. 9153. See p. 474.

*SHERARDIA ARVENSIS L. DINWIDDIE COUNTY: shaded argillaceous grassland south of Burgess Station, no. 10,030.

HOUSTONIA LONGIFOLIA Gaertn. Reaching the Coastal Plain in SURRY COUNTY: rich calcareous wooded gullies along James River, Eastover, no. 8859. SOUTHAMPTON COUNTY: rich mixed and deciduous woods near Nottoway River, above Carey Bridge, no. 10,432. See p. 466.

OLDENLANDIA BOSCII (DC.) Chapm. CHESTERFIELD COUNTY: margin of exsiccated old mill-pond in Swift Creek, Lakeview, no. 9439. See p. 477.

VIBURNUM AFFINE Bush, var. HYPOMALACUM Blake. AMELIA COUNTY: border of woods west of Ammon, no. 9155. See p. 474.

SPECULARIA BIFLORA (R. & P.) Fisch. & Meyer. Characteristic of fallow fields and roadsides. DINWIDDIE COUNTY: east of Burgess Station, no. 10,041; near Burgess Station, no. 10,042. SOUTHAMPTON COUNTY: Franklin, no. 10,044. GREENSVILLE COUNTY: north of Skipper's, no. 10,043. See p. 496.

CAMPANULA AMERICANA L. Rich calcareous wooded slopes, ravines and thickets along the James, SURRY COUNTY: Claremont Wharf, no. 9158; Sunken Meadow Beach, no. 9159; Eastover, no. 8860. See pp. 466, 475.

LOBELIA SIPHILITICA L. SURRY COUNTY: wet ditch at border of woods west of Claremont, no. 9160; along rills, slopes of gullies in rich beech woods 1½ miles north of Surry, no. 9444; damp rich deciduous woods 1½ miles east of Blizzard's Corners, no. 9445. See p. 475.

*LOBELIA PUBERULA Michx., forma **candida**, f. nov., corollis albidis.—VIRGINIA: wooded swamp about 2 miles southeast of Cleopus,

Nansemond County, October 15, 1938, *Fernald & Long*, no. 9631 (TYPE in Gray Herb.).

EUPATORIUM SESSILIFOLIUM L., var. VASEYI (Porter) Fern. & Grisc. DINWIDDIE COUNTY: dry clearings and borders of woods south of Burgess Station, no. 9169. SOUTHAMPTON COUNTY: dry sandy woods and thickets near Three Creek, Drewryville, no. 9170.

Notable occurrence on the Coastal Plain of a characteristic plant of the mountains. See p. 476 and MAP 11.

KUHNIA EUPATORIOIDES L. To the station already recorded add from PRINCE GEORGE COUNTY: border of dry woods northwest of Talpa, no. 9635.

*HETEROTHECA SUBAXILLARIS (Lam.) Britton & Rusby. ISLE OF WIGHT COUNTY: dry sandy roadside and waste places, Lee's Mill, no. 8873.

Apparently the first from between North Carolina and Maryland. See p. 469.

*SOLIDAGO BICOLOR L., var. OVALIS Farwell. NORTHAMPTON COUNTY: dry sandy pine woods, Eastville, no. 5506. NANSEMOND COUNTY: woods about 2 miles southeast of Cleopus, no. 9175; moist argillaceous pine and oak woods and clearings north of Factory Hill, no. 9637.

Described from Michigan, var. *ovalis* is represented in the Gray Herbarium from Indiana, Kentucky, Tennessee and West Virginia as well as from the Coastal Plain of Virginia.

SOLIDAGO JUNCEA Ait. Apparently unknown on the Coastal Plain of southeastern Virginia. Our southeastern station is in CAROLINE COUNTY: border of woods west of Guinea, no. 9176.

SOLIDAGO PINETORUM Small. Range extended westward into the outer Piedmont in AMELIA COUNTY (no. 9177) and CAROLINE COUNTY (no. 9178), and on the Coastal Plain northward to GLOUCESTER COUNTY (no. 8876). See pp. 467, 474.

SOLIDAGO SPECIOSA Nutt. NANSEMOND COUNTY: border of sandy woods, South Quay, no. 6714; dry sandy roadside thicket, South Quay, no. 9639.

Although collected (very immature) in August, 1936, *Solidago speciosa* has not been reported, for want of flowering material (now at hand, collected October 13, 1938). It is a species of the interior and on the Coastal Plain, within a few miles of extensive sandy pine barrens, far-isolated from the Blue Ridge, the only other region of Virginia and North Carolina represented in the Gray Herbarium. At the first cited station in Nansemond County it is a close neighbor of *Carphephorus bellidifolius!*

*S. Elliottii T. & G. Henrico County: sphagnous springy swale bordering Whiteoak Swamp, west of Elko Station, nos. 9179, 9461. As noted on pp. 473 and 478 this is the southeastern typical form of the species, new to Virginia.

S. graminifolia (L.) Salisb., var. Nuttallii (Greene) Fernald. Local range extended south to Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 9467.

Aster spectabilis Ait., var. suffultus Fernald in Rhodora, xxxviii. 447, plates 451 and 452. Described from Hampton, now found southward into North Carolina.[1] Sussex County: border of pineland northwest of Wakefield, no. 8880. Nansemond County: border of dry woods about 2 miles southeast of Cleopus, no. 9189.

A. grandiflorus L. Very precocious colony in Dinwiddie County: dry clearings and borders of woods south of Burgess Station, July 16, 1938, no. 8884; also in Brunswick County: dry upper border of argillaceous swale about 5 miles east of Edgerton, July 18, 1938, no. 8885.

Ordinarily *Aster grandiflorus* is the latest-flowering species of the genus, its splendid rich purple-violet heads expanding in October. The two colonies of plants flowering in July are most precocious. As usual, *A. grandiflorus* in 1938 generally began flowering in October.

A. laevis L. York County: wooded bank, York River, northwest of Yorktown, no. 7682.

Our only Coastal Plain station; not seen by Grimes.

*A. dumosus L. Greensville County: sphagnous bog about 1 mile northwest of Dahlia, no. 9473.

Wiegand, in Rhodora, xxx. 165 (1928), cites typical *A. dumosus* (the abundant plant of eastern Virginia is var. *coridifolius* (Michx.) T. & G.) only from southern Maine to New Jersey and southeastern Pennsylvania, with an isolated area on the Blue Ridge of North Carolina.

*A. dumosus, var. subulaefolius Torr. & Gray. Greensville County: with the last, no. 8886.

Wiegand, l. c. 168, had seen the variety (originally from Louisiana) from two areas: southeastern Massachusetts and southern Rhode Island; South Carolina to Florida, thence to Texas.

A. infirmus Michx. Henrico County: dry oak woods and clearings bordering Whiteoak Swamp, west of Elko Station, no. 9475.

Our first station on the Coastal Plain, but once found by Grimes in James City County.

[1] North Carolina: border of moist argillaceous pine and oak woods 1½ miles northeast of Dort School, Gates County, no. 9643. See p. 487.

Photo. W. H. Hodge

VERONICA SALINA, forma LAEVIPES (*V. catenata*): FIG. 1, branch, × 1, from California; FIG. 2, branch, × 1, from Bavaria.

Photo. W. H. Hodge

VERONICA SALINA (*V. catenata*, subsp. *glandulosa*) and forma LAEVIPES (*V. catenata*): FIG. 1, branch of slightly glandular plant, × 1, from Indiana; FIG. 2, branch, × 1, from Austria; FIG. 3, fruit, × 8, from South Dakota; FIG. 4, fruit, × 8, from Austria.

ACANTHOSPERMUM AUSTRALE (Loefl.) Ktze. To the station long ago reported by Harper add one from GREENSVILLE COUNTY: sandy railroad embankment south of Skipper's, no. 9651.

*SILPHIUM ATROPURPUREUM Retz., forma **hirticaule**, f. nov., caule hispido.—Greensville County, VIRGINIA: mixed with the typical glabrous-stemmed plant, border of rich woods near Metcalf Branch, north of Emporia, August 20, 1938, *Fernald & Long,* no. 9199.

IVA FRUTESCENS L. Extends up the James at least to SURRY COUNTY: sandy beach of James River at mouth of Crouch Creek, east of Scotland, no. 9476.

RUDBECKIA TRILOBA L. Local on the Coastal Plain. PRINCE GEORGE COUNTY: wooded slope near Bailey's Creek, east of Hopewell, no. 9204. SURRY COUNTY: rich calcareous woods at head of Sunken Meadow Creek, south of Claremont, nos. 8502 and 9205. GREENSVILLE COUNTY: bottomland woods along Metcalf (on the label erroneously called Caney) Branch, east of Emporia, *Fernald, Griscom & Long,* no. 6727.

R. FULGIDA Ait. To the single Coastal Plain record (Williamsburg) published by Mrs. Erlanson add the following. CHESTERFIELD COUNTY: exsiccated swale northeast of Colonial Heights, no. 9478. SUSSEX COUNTY: border of moist woods south of Stony Creek, no. 9206; thicket bordering pineland about 2 miles east of Stony Creek, no. 9652; damp woods bordering Assamoosick Swamp, about 2 miles northeast of Homeville, no. 9207; damp pine and oak woods and thickets north of Jarratt, no. 9479. GREENSVILLE COUNTY: Emporia, September 22, 1913, *Tidestrom,* no. 6919. See p. 475.

*HELIANTHUS CUCUMERIFOLIUS Torr. & Gray. ISLE OF WIGHT COUNTY: dry sandy roadsides and waste places, Lee's Mill, no. 8897.

Escape from cultivation; native of the Gulf States.

COREOPSIS TRIPTERIS L. A plant primarily of the interior of the continent, found locally on the Coastal Plain. SUSSEX COUNTY: border of moist woods south of Stony Creek, no. 9217; exsiccated argillaceous pineland about 2 miles east of Stony Creek, no. 9221; damp woods bordering Assamoosick Swamp, about 2 miles northeast of Homeville, no. 9222. GREENSVILLE COUNTY: border of rich deciduous woods (just at the Fall Line) by Three Creek, north of Emporia, no. 9219. SOUTHAMPTON COUNTY: border of swampy woods about 1 mile northeast of Branchville, no. 9218. Also at the eastern border of the Piedmont: AMELIA COUNTY (boggy swale, Otterburn, about 1 mile west of Amelia Courthouse, no. 9216) and in CAROLINE COUNTY (border of woods west of Guinea, no. 9220). See p. 475.

Search through the geographically unorganized citations by Sherff fails to find any material cited from Virginia.

BIDENS CORONATA L., var. TRICHOSPERMA (Michx.) Fernald. See RHODORA, xl. 350, pl. 506, figs. 8 and 9 (1938). A very extensive

station in Surry County: tidal marsh at mouth of Crouch Creek, east of Scotland, nos. 9486 and 9658.

B. comosa (Gray) Wiegand. Henrico County: field behind Stadium, University of Richmond, September 28, 1934, *M. Ellyson & C. Puette* (as *Solidago squarrosa*!, marked "common," this, in view of the misidentification, perhaps to be questioned); swampy thicket bordering Whiteoak Swamp, south of Elko Station, no. 9485. See p. 478.

A fifteen-minute search of the geographically unorganized stations cited by Sherff reveals no Virginian station in the southeastern counties.

Helenium nudiflorum Nutt. Surry County: border of roadside ditch west of Surry, no. 10,845. Greensville County: peaty and argillaceous clearing about 4 miles southeast of Emporia, no. 8511; pastured field northeast of Emporia, no. 10,451.

*H. brevifolium (Nutt.) Gray. Greensville County: along a seepy old woodroad north of Dahlia, no. 10,051.

First from north of North Carolina. See p. 491.

Artemisia annua L. Greensville County: railroad yard, North Emporia, no. 9487.

Senecio obovatus Muhl. Surry County: rich alluvial woods and thickets back of sand-beach of James River, Eastover, no. 8901. See p. 466.

Cirsium Nuttallii DC. To the single known station in the state add another, also in Southampton County: exsiccated swampy woods about 1 mile southwest of Branchville, no. 9224.

Chondrilla juncea L. Range extended southward from the northern part of the state to Caroline County: sandy open slope, north of Golansville, no. 9225. Dinwiddie County: cinders of freight-yard, Norfolk and Western Railroad, Petersburg, no. 10,847.

*Lactuca canadensis L., var. latifolia Ktze., forma **villicaulis** f. nov., caulibus villosis.—Virginia: abundant with the glabrous plant, clearing west of Burgess Station, Dinwiddie County, July 16, 1938, *Fernald & Long*, no. 8903 (type in Herb. Gray; isotype in Herb. Phil. Acad.); sandy roadside thicket south of Reams, Dinwiddie County, July 14, 1938, *Fernald & Long*, no. 8902; swampy woods about 1 mile west of Skipper's, Greensville County, September 18, 1938, *Fernald & Long*, no. 9490.

Prenanthes autumnalis × serpentaria. A small group of very large plants with a clear combination of the characters of the two common species, in Nansemond County: seeping bank of ditch at margin of woods, about 2 miles southeast of Cleopus, no. 9661.

P. altissima L. Surry County: slopes of gullies in rich woods 1½ miles north of Surry, no. 9491.

A Coastal Plain station for a northern and montane species. See p. 477.

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1. DESMODIUM: PRELIMINARY STUDIES—I

By Bernice G. Schubert

(Plates 1 and 2)

Preliminary to a treatment of the new-world members of the genus *Desmodium* a series of briefer studies of several groups of species will be presented. The question of generic limits, however, and treatment of subgeneric categories, as such, will be deferred until the entire revision is more nearly complete.

In this paper most of the species noted by Schindler under *Meibomia*, subgenus *Cyclomorium*, are treated, and an attempt is made to clarify the complexities which surround the widespread species *Desmodium procumbens* (Mill.) Hitchc. Two new species and several new varieties and combinations are proposed, and new stations for some of the rarer species are recorded.

The author is very glad to acknowledge the generous loan of specimens made possible by the curators of the following herbaria: Arnold Arboretum (A), Dudley Herbarium, Stanford University (D), Field Museum (F), Royal Botanic Gardens, Kew (K), New York Botanical Garden (NY), Academy of Natural Sciences, Philadelphia (P), Desert Laboratory, Tucson, Arizona (T), United States National Museum (US), and by Mr. H. S. Gentry who lent many specimens from his personal collection (HG).[1] The author is also especially grateful to Mr. C. V. Morton, of the United States National Herbarium, who made many helpful suggestions and kindly renounced a new species and several new combinations which were prepared simultaneously with those made during this study; to Dr. Lyman B. Smith for the generous use of his base maps and to Professor M. L. Fernald under whose supervision this work has been carried on.

A. Desmodium procumbens and Related Species

In 1894 Robinson and Greenman characterized *Desmodium procumbens* and its allies as "one of the most puzzling groups of the genus." This is a comparatively widespread and common

[1] Specimens not otherwise designated are in the Gray Herbarium (G).

group which has been variously misinterpreted on account of the lack of stability in the vegetative characters.

In 1768 Miller described *Hedysarum procumbens*, the type of which was collected by Houstoun in Jamaica[2] in 1730.[3] In 1788 Swartz described *Hedysarum spirale*, also based on a specimen from Jamaica, and cited Miller's name in synonymy. De Candolle, in 1825, transferred Swartz's name to *Desmodium* and the complex was generally treated as *Desmodium spirale* (Sw.) DC. until 1893 when Hitchcock transferred Miller's name to *Desmodium* and reduced De Candolle's name to synonymy. The specimen on which Miller based his description was seen by Fawcett and Rendle. At the present time, however, it is unfortunately not available.[4] I am treating as variety *typicum*, therefore, the element represented by *Wm. Harris*, no. 11852 from Hope Grounds, Jamaica (also cited by Fawcett and Rendle in Fl. Jamaica iv. 36 (1920)). Since the Jamaican material and the West Indian material, in general, is remarkably uniform there seems to be no reason for taking up Swartz's species unless re-examination of the type should prove it distinct. Schindler, who saw Swartz's type, considered it identical with Miller's.

Robinson and Greenman, who first attempted to organize the group and proposed varietal status under *Desmodium spirale* (Sw.) DC. for several closely related entities described by Asa Gray, confused two elements in their concept of the typical form. Schindler, who has most recently studied the group,[5] considered as many distinct species the entities which I am treating as varieties of *Desmodium procumbens*, as well as those I am combining under *D. neo-mexicanum*. Other students have at one time or another proposed variations of the two treatments in an attempt to solve the problem both taxonomically and nomenclaturally. The key to the species and varieties and the rather detailed diagnoses which follow are presented to make quite clear the author's concept of the group.

[2] Miller, Gardener's Dictionary (1768), Hedysarum no. 10, of which the author said on a page following the diagnosis "The tenth sort grows naturally in Jamaica."

[3] See Britten and Baker, Houstoun's Central American Leguminosae. Journ. Bot. (Brit. & Foreign) xxxv. 225–234 (1897).

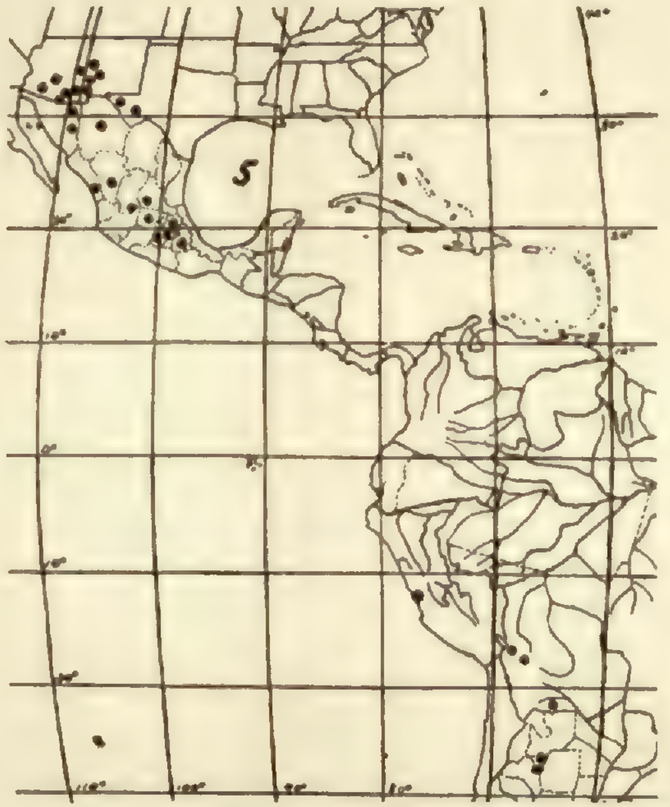
[4] I am indebted to Mr. C. A. Weatherby of the Gray Herbarium and members of the staff of the British Museum who kindly searched for this specimen during the past summer. It had, presumably, already been stored with other types, for safe-keeping during the present uncertain conditions.

[5] A. K. Schindler in Rep. Spec. Nov. Reg. Veg., xxii. 283 (1926).

a. Articles of the loment with opposite margins alternately strongly involute and revolute, giving loment a spirally twisted appearance....*b*.
b. Leaves with leaflets essentially uniform in shape throughout the plant; leaflets, in general, broader at base. longer than broad.
Pedicels short, straight, stout; bracts deciduous; rachis chiefly uncinulate-hispidulous.
Articles of loment rhomboid, all similar, the terminal rarely larger.....*D. procumbens*, var. *typicum*.
Terminal article (sometimes two) varying from others, triangular.....*D. Wigginsii*.
Pedicels long, flexuous, filiform; bracts persistent; rachis glabrous to pilose.....*D. procumbens*, var. *longipes*.
b. Leaves with leaflets variously shaped throughout plant. those of lower leaves broader than long.
All leaflets transversely-elliptic or some rhombic. *D. procumbens* var. *transversum*.
Upper leaves with linear or linear-lanceolate leaflets. *D. procumbens* var. *exiguum*.
a. Articles of the loment with only sinuate margins, loment entirely without spirally twisted aspect.....*D. neo-mexicanum*.

DESMODIUM PROCUMBENS (Mill.) Hitchc., var **typicum.** Herbaceous, with a longish slender usually unbranched root, many slender or a few stout subangulate sparsely to densely uncinulate-hispidulous branches arising from the base (these ascend, soon bend over and with the inflorescence produce a highly congested appearance): leaves trifoliolate, petiolate: petioles ribbed, uncinulate-puberulent, 0.9–5.3 cm. long:[6] petiolules dark in color, rugulose, patent-pilose and uncinulate-hispidulous, 0.8–2 mm. long: leaflets glabrous to moderately strigose or uncinulate-puberulent, or both, above and below (chiefly on midrib and veins), with margins ciliate, slightly revolute, leaflets of the slender-branched plants much smaller than those of the stouter plants; terminal leaflets elliptic, slenderly to rather broadly ovate or (most often) rhombic, acute or obtuse (rarely short-acuminate), broadly acute to rounded or truncate at base, 0.9–5.5 cm. long, 0.3–2.3 cm. broad; lateral leaflets linear-lanceolate or elliptic to ovate or rhombic, acute or obtuse, obtuse or truncate at base, 0.5–3.9 cm. long, 0.25–1.8 cm. broad: stipules striate, ciliate, ovate-acuminate, broad at base (often cordate) soon becoming very narrow, 1–4.6 mm. long: stipels subulate, ciliate, 0.4–2.6 mm. long: rachises of the inflorescence subangulate, uncinulate-puberulent to -hispid and somewhat patent-pilose: bracts linear-lanceolate to lance-ovate, ciliate, puberulent to strigose, 1–3.2 mm. long: pedicels stout, 0.3–1.15 cm. long, uncinulate-puberu-

[6] Petiole-measurements, in all cases, are taken from base of petiole to base of petiolule of terminal leaflet.



MAP 1, range of DESMODIUM PROCUMBENS, var. TYPICUM (in New World only); 2, var. LONGIPES; 3, var. TRANSVERSUM; 4, var. EXIGUUM; 5, D. NEO-MEXICANUM; 6, D. ROSEI; 7, D. WIGGINSII; 8, D. ANGUSTIFOLIUM, var. GRAMINEUM; 8a, var. TYPICUM; 9, D. WYDLERIANUM.

lent, at an angle of 90° (or slightly less) to the rachis: calyx strigose, the teeth short-ciliate; upper lobe bifid, about 1.5–2 mm. long; central tooth of lower lobe 1.4–2 mm. long, lateral teeth 1.5–1.7 mm. long: corolla exceeding calyx; standard obovate, becoming retuse at maturity, 2.5–3.4 mm. long, 2.5–3.2 mm. broad (at broadest portion); wings about equalling standard; keel-petals somewhat longer than the wings, unguiculate, 2.8–3.8 mm. long: loment 4–6-articulate, substipitate; articles uncinate-hispidulous, 2.4–4.2 (–5) mm. long, 1.6–3 (–3.2) mm. wide, margins alternately involute and revolute, giving loment a spirally twisted aspect.—PL. 1, FIGS. B, 1–7. MAP 1.—*D. procumbens* (Mill.) Hitchc. in Rep. Mo. Bot. Gard. iv. 76 (1893). *Hedysarum procumbens* Mill. Gard. Dict. ed. viii (1768) (Hedysarum no. 10). *Meibomia procumbens* (Mill.) Schindler in Rep. Spec. Nov. Reg. Veg. xx. 151 (1924). *Hedysarum spirale* Sw. Prod. 107 (1788). *Desmodium spirale* (Sw.) DC. Prod. ii. 332 (1825). *Meibomia spiralis* (Sw.) Ktze. Rev. Gen. i. 197 (1891). *Desmodium sylvaticum* Benth. Pl. Hartweg. i. 116 (1843). *M. procumbens* (Mill.) Schindl., var. *sylvatica* (Benth.) Schindl. loc. cit. Of the other synonyms generally assigned to this species, among them *Desmodium tenuiculum* DC., *D. Chamissonis* Vogel, *D. Sprengelii* D. Dietr., it has not been possible to examine the type specimens and no formal disposition of these names will be made at present. —Mexico, Central America, the West Indies and the northern half of South America; tropical Africa and the Philippine Islands (where it is probably introduced). MEXICO: SINALOA: Copradia, October 20, 1904, *Brandegee*, s.n. NAYARIT: in woods south of penal colony, Maria Madre, Tres Marias Islands, October 22, 1925, *Ferris*, no. 5603 (D, US). COLIMA: hills west of Manzanillo, November 27, 1925, *Ferris*, no. 6027 (D, G, US). MEXICO: prairie, Tejupilco, Temascaltepec, September 30, 1932, *Hinton*, no. 1928 (G, K). OAXACA: Ejutla, in convalle, October, 1842, *Liebmann*, no. 4794. GUERRERO: Coyuca, Dist. Coyuca, October 3, 1935, *Hinton et al.*, no. 8517 (K); cattle trail near stream, Temisco, Barranca de las Flores, Dist. Adama, Sierra Madre del Sur, north of Rio Balsas, November 8, 1937, *Mexia*, no. 8768; Acapulco and vicinity, October, 1894 to March, 1895, *E. Palmer*, nos. 67 & 78. YUCATAN: forests of Buena Vista Xbac, *Gaumer*, no. 1118 (US). SALVADOR: Dept. SAN VICENTE: along stream, vicinity of San Vicente, alt. 350–500 m., March 2–11, 1922, *Standley*, no. 21728. COSTA RICA: GUANACASTE: bords des chemins à Nicoya, January, 1900, *Tonduz* (herb. Inst. Physico-Geogr. no. 13583). CUBA: PINAR DEL RIO (?): in pastures, Toscano,[7] 1865, *Wright*, no. 2319. MATANZAS: in montanis

[7] [Toscano] "Probably the name of a finca near the N. coast, somewhat E. of Bahia Honda—E." See Underwood in Bull. Torr. Bot. Cl. xxxii. 297 (1905).

circa Matanzas, 1849, *Rugel*, no. 127 (NY). SANTA CLARA: Vilches Hill, Limones, Soledad, Cienfuegos, November 2, 1928, *J. G. Jack*, no. 6581. JAMAICA: Hope Grounds, 700 ft. alt., December 18, 1896, *Harris*, no. 6637 (NY); same locality, *Harris*, no. 11852 (G, NY); no locality given, *McFadyen*, s.n. HISPANIOLA: DOMINICAN REPUBLIC: Santo Domingo, prope Maniel de Ocoa, 300 m. alt. in fruticeto, October, 1910, *von Türckheim*, no. 3624 (NY). PORTO RICO: PONCE: inter Coamo et Aybonito, in declivibus, November 4, 1885, *Sintenis*, no. 1981. AGUADILLA: Aibonito, Bo. Azomante, Dist. Bayamon, November 14, 1937, *Otero*, no. 278. LESSER ANTILLES: ST. THOMAS: December, 1880, *Eggers*, no. 227; hillside thicket, Water Island, January 31–February 4, 1913, *Britton, Britton, & Shafer*, no. 106 (NY); February 26, 1874, *Kuntze*, no. 217 (NY). ST. CROIX: Bassin, roadside, November 26, 1895, *Ricksecker*, no. 117. LEEWARD ISLANDS: BONAIRE: 1909–1910, *Boldingh*, no. 7078 (NY). BRITISH GUIANA: outskirts of the city, approximate sea level, Georgetown, August 25, 1935, *David Potter*, no. 5258. VENEZUELA: TRUJILLO: around swamp, subtrailing in sunny places, La Ceiba, December 4, 1922, *Pittier*, no. 10893; trailing in savannas around bushes, Dividive, November 30, 1922, *Pittier*, no. 10865. SUCRE: vicinity of Cristobal Colon, La Planisa, January 5–February 22, 1923, *Broadway*, no. 339; near the river, vicinity of Cristobal Colon, same date, *Broadway*, no. 320. COLOMBIA: MAGDALENA: Santa Marta, alt. 100 ft., November 1898–1901, *H. H. Smith*, no. 268. BOLÍVAR: Torrecilla, near Turbaco, alt. 150–300 m., November 7–19, 1926, *Killip & Smith*, no. 14641. ECUADOR: GUAYAS: in sylvis prope Guayaquil, *Hartweg*, no. 650 (G, NY, isotypes of *D. sylvaticum* Benth.). GALAPAGOS ARCHIPELAGO: Bindloe Island, September, 1891, *G. Baur*, s.n.; on rocks near sand beach, James Bay, James Island, April, 1899, *Snodgrass & Heller*, no. 379; South Seymour Island, May, 1899, *Snodgrass & Heller*, no. 609; tolerably common in shady places from near beach to 1000 ft. alt., Tagus Cove, Albemarle Island, March, 1899, *Snodgrass & Heller*, no. 193 (D, G); Gardner Island, May, 1899, *Snodgrass & Heller*, no. 644 (D, G); Hood Island, May, 1899, *Snodgrass & Heller*, no. 734 (D, G); Charles Island, May, 1899, *Snodgrass & Heller*, no. 444. BRAZIL: PARÁ: 1829, *Burchell*, no. 9092; ad ripas fluminis das Trombètas et lacus Quiriquiry, December, 1849, *Spruce*. CEARÁ: low thickets about Açude Columinjuba, Municipio de Maranguape, October 9, 1935, *Drouet*, no. 2581. FERNANDO DO NORONHA: S. Antonia bay, 1887, *Ridley, Lea & Ramage*, no. 24. RIO DE JANEIRO: Ilha das Flores, May, 1896, *Reineck*, s.n.

Var. **longipes** (Schindler), comb. nov. Herbaceous, annual, with

delicate, branched root-system, and more or less flexuous, striate, subangulate, glabrous to moderately pilose branches arising from base: leaves trifoliolate or upper unifoliolate, petiolate; petioles ribbed, moderately pilose, 1.15–6.4 (–10.5) cm. long; petiolules darker, broader, patent-pilose, 1.4–2 mm. long; leaflets thin, with prominent midrib and chief veins and much less prominent cross-veins, appressed-pubescent on both surfaces, densely so when young, margins somewhat ciliate; terminal leaflets broadly ovate, obtuse or acute, 1.65–6.3 (–9.2) cm. long, 0.8–4.35 (–5.6) cm. broad; lateral leaflets smaller, elliptic or elliptic-ovate, acute to obtuse, usually truncate or obtuse at base as are terminal leaflets, 0.8–3.9 (–6.65) cm. long, 0.5–2.2 (–3.5) cm. broad: stipules semi-cordate, abruptly long-acuminate, striate, ciliate, 1.6–3.8 mm. long, early deciduous: stipels subulate (or rarely linear-lanceolate), ciliate, 0.8–2.3 mm. long: inflorescence racemose-paniculate; rachises flexuous, uncinulate-puberulent and usually densely patent-pilose: bracts subulate to lance- or ovate-acuminate, ciliate, apparently deciduous at maturity of flower, primary bracts 0.7–1.8 mm. long, secondary bracts 0.4–1 mm. long: pedicels filiform, very short-uncinulate-puberulent, sometimes also sparsely patent-pilose, at maturity of fruit usually perpendicular to rachis, 0.6–1.85 cm. long: calyx rather densely pilose; upper lobe bifid, 1–1.4 mm. long; central tooth of lower lobe 1–1.5 mm. long, lateral teeth 1.5 mm. long: corolla exceeding calyx; standard narrowly obovate, about 3.5 mm. long and 1.6 mm. broad at upper end; wings unguiculate, slightly longer, about 3.6 mm. long, 1 mm. broad; keel-petals falcate, unguiculate, about 3.5 mm. long, 1 mm. broad: loment 3–5 (–6)-articulate, sessile or substipitate; articles rhomboid, glabrous to uncinulate-puberulent, appearing spirally twisted, margins alternately involute and revolute, sutures often glabrous and very prominent.—PL. 1, FIG. B, 12. MAP 2.—*Meibomia tenella* (HBK.) Ktze., var. *longipes* Schindl. in Rep. Spec. Nov. Reg. Veg. xx. 151 (1924). *Hedysarum tenellum* HBK. Nov. Gen. et Sp. vi. 522 (1824), non D. Don, Prod. Fl. Nep. 243 (1825), non Spreng. ex DC. Prod. ii. 333. (1825) in synon. *Desmodium tenellum* (HBK.) DC. Prod. ii. 333 (1825). *Meibomia tenella* (HBK.) Ktze. Rev. Gen. i. 198 (1891). *Desmodium spirale* sensu Robinson & Greenman, p.p., in Proc. Am. Acad. xxix. (n.s. xxi.) 384 (1894), non (Sw.) DC.—Southern Mexico, Central America to northern South America.—MEXICO: VERA CRUZ: Corral de Piedros, Zacuapan, September, 1917, *Purpus*, no. 8015. JALISCO: near Guadalajara, September, 1903, *Rose & Painter*, no. 7407 (NY); shaded banks, barranca near Guadalajara, October 3, 1891, *Pringle*, no. 3882 (G, US). MEXICO: Palmar, dist. Temascaltepec, alt. 650 m., November 9, 1933, *Hinton*, no. 5187 (K).

GUATEMALA: Santa Rosa: Chupadero, 5000 pp. alt., October, 1892, *Heyde et Lux* ex J. D. Smith, no. 3751 (G, US); Cerro Redondo, 4500 pp. alt., November, 1893, *Heyde et Lux* ex J. D. Smith, no. 6114. SALVADOR: San Salvador: Candelaria near San Salvador, June, 1923, *Calderon*, no. 1432 (G, US). COSTA RICA: San José: environs de San José, 1100 m. alt., November, 1902, Pittier (herb. Inst. Physico-Geogr. no. 16599) (US); San Francisco de Guadalupe, alt. 1100 m., December, 1895, *Tonduz* ex J. D. Smith, no. 7008 (herb. Inst. Physico-Geogr. no. 9811). Cartago: Cartago, alt. 4250 pp., November, 1887, *J. J. Cooper* ex J. D. Smith, no. 5750 (G, US). Guanacaste: bords des chemins à Nicoya, January, 1900, *Pittier*, no. 13582 (US) [annotated by Schindler as var. *longipes*]. PANAMA: Coclé: vicinity of Olá, 100–350 m. alt., December 7–9, 1911, *Pittier*, no. 5080 (US). CANAL ZONE: Rio Grande: near Culebra, 50–100 m. alt., December, 1910, *Pittier*, no. 2126 (US) [annotated by Schindler as var. *longipes*]. VENEZUELA: Aragua: near Colonia Tovar, 1856–7, *Fendler*, no. 1785. Distrito Federal: Caracas, ex hb. *Humboldt* (G, photo. type of *Hedysarum tenellum* [Field Mus. Ser. 2261]). ECUADOR: Guayas: Guayaquil, May 6, 1923, *Anthony & Tate*, no. 48 (US).

Desmodium procumbens var. *longipes* is the name which must be taken up for *Hedysarum tenellum* HBK., when that entity is treated as a variety. Variety *longipes* was described by Schindler in 1924 as having "Rhachis racemi glabra, pedicelli ad 20 mm. longi." Rachises of the several specimens from the U. S. National Herbarium annotated by Schindler as this variety are covered, moderately to densely, with an uncinulate puberulence; in no case is the rachis glabrous, and sparsely scattered, long, straight spreading hairs are found occasionally. The length of the pedicel, in itself, seems to be a poor character on which to base a variety, since it is not at all constant, and furthermore the average length of the pedicels on specimens considered by Schindler as representative of the variety, is much less than 20 mm.

Hedysarum tenellum was for a long time thought to be a taxonomic synonym of *D. procumbens* (*D. spirale* (Sw.) DC.), a disposition of it prompted, perhaps, by the statement of the original authors (following their detailed description): "H. spirali Swartz. simillimum videtur." Robinson and Greenman treated as representative of *D. procumbens* many thin, broad-leaved specimens with slender pedicels and loments composed of very small, much-contorted articles (among them *Fendler*, nos. 1785 and 1786 and *Pringle*, no. 3882) chiefly, it seems, because of their "roundish-

ovate leaflets." Plants such as the cited specimens and additional numbers which agree with them in diagnostic characters are not found in Jamaica (or any of the West Indian Islands) whence Swartz described his *H. spirale*. These specimens agree rather with the type of *Hedysarum tenellum* described from Caracas, Venezula, and found also in Ecuador (*Anthony & Tate*), Central America and sparingly northward in Mexico.

It is unfortunate that the epithet *tenellum* is not available for use in varietal rank. Since Schindler's var. *longipes* is the first varietal epithet applicable to any part of the group as here defined it must be taken up.

Var. **transversum** (Robinson & Greenm.), comb. nov. Herbaceous annual with slender tap-root, branched and usually spreading from base: branches slender, glabrescent to retrorsely uncinulate-hispidulous: basal leaves unifoliolate, usually so throughout plant or less often the upper trifoliolate, petiolate: petioles 0.3–2.5 cm. long, puberulent to patent-pilose, often retrorsely so: petiolules darker, more densely patent-pilose (not retrorsely), 0.8–1.5 mm. long: leaflets varying from rhombic or cuneate to elliptic or oblong with variations of each type, at least the lower and middle broader than long, occasionally the upper leaflets longer than broad, 0.6–2.7 cm. broad, 0.35–1.9 (–2.4) cm. long, margins ciliate, sometimes slightly revolute, upper surface glabrescent to pilose (with tuberculate-based hairs), frequently uncinulate-hispidulous along midrib and veins: stipules lanceolate to slenderly lance-ovate with long-attenuate apex, striate, ciliate, 0.8–3.5 mm. long: stipels subulate, ciliate, 0.8–1.8 mm. long: rachis of inflorescence minutely uncinulate-puberulent and moderately patent-pilose: bracts persistent, narrowly ovate, long-attenuate, striate, ciliate, 1–3.1 mm. long: pedicels uncinulate-puberulent to pilosulous, 0.52–1.26 cm. long in flower, 0.6–1.4 cm. long in fruit: flowers small, 1.6–2 mm. long (unopened): calyx pilose; upper lobe bifid, 1–1.2 mm. long; central tooth of lower lobe 1–1.6 mm. long, lateral teeth 0.9–1.4 mm. long: corolla exceeding calyx; standard obovate, slightly retuse, about 2.6 mm. long, equally broad at broadest portion; wings equalling standard in length; keel-petals slightly longer (about 2.8 mm. long): lo-ment stipitate, 2–4-articulate; stipe essentially glabrous, 2.2–3.6 mm. long; articles rhomboid, 1.8–3 mm. long, 1.2–2.5 mm. wide, moderately uncinulate-hispid, opposite margins alternately involute and revolute.—Pl. 1, fig. B, 10, 11. Map. 3.—*Desmodium spirale* (Sw.) DC., var. *transversum* Robinson & Greenm. in Proc. Am. Acad. xxix. 384 (1894). *Meibomia transversa* (Robinson & Greenm.) Schindl. in Rep. Spec. Nov. Reg. Veg. xx. 154 (1924).

Desmodium transversum (Robinson & Greenm.) Standley in Field Mus. Pub. Bot. xi. 160 (1936).—Southern Mexico, Costa Rica to northern South America.—MEXICO: Jalisco: Chapala, September 18, 1899, *Holway*, no. 3447; bluffs of barranca, near Guadalajara, September 26, 1891, *Pringle*, no. 5179 (G, type); hillsides near Guadalajara, September 6, 1893, *Pringle*, no. 4522 (G, NY, US). Mexico: Plaza de Gallos, dist. Temascaltepec, alt. ±950 m., September 17, 1932, *Hinton*, no. 1754. COSTA RICA: Guanacaste: bords des chemins à Nicoya, January, 1900, *Tonduz*, no. 13584 (US). VENEZUELA: Carabobo: on rocky slopes, Hacienda de Cura, near San Joaquin, alt. 480–1200 m., October 18–24, 1918, *Pittier*, no. 8231 (G, US).

Var. **exiguum** (Gray), comb. nov. Herbaceous annual with rather short slender root, branched from base: branches slender, uncinulate-puberulent or -pubescent to -hispid, sometimes also patent-pilose: leaves unifoliolate at base, usually trifoliolate above, petiolate: petioles 0.6–3.75 cm. long, ridged and subangulate, moderately to densely patent-pilose and uncinulate-puberulent or -pubescent: petiolules darker, more densely patent-pilose, somewhat rugulose, 0.6–1.5 mm. long: basal leaflets chiefly transversely rhombic or elliptic, 0.6–2.7 cm. long, 0.94–2.6 cm. wide; upper leaflets linear or linear-lanceolate, 0.9–5.35 cm. long, 0.3–1.1 cm. wide, all essentially glabrous to pilose or uncinulate-pubescent on both surfaces, chiefly along midrib and veins: stipules striate, ciliate, obliquely ovate, becoming abruptly long-attenuate or narrowly linear-lanceolate and long-acuminate, 1.8–5 mm. long: stipels ciliate, subulate, 0.6–2.2 mm. long: rachises of inflorescence sparsely to densely uncinulate-puberulent and often also moderately to densely patent-pilose: bracts not conspicuous, the primary chiefly reflexed when present, 1.2–3.4 mm. long, striate, ciliate, ovate-acuminate with long-attenuate apex or linear-lanceolate, often early deciduous; secondary bracts subulate, ciliate, 0.6–1.2 mm. long: pedicels moderately uncinulate-puberulent, 0.76–1.5 cm. long: calyx minutely uncinulate-puberulent and somewhat pilose; upper lobe bifid, 0.9–1.2 mm. long; central tooth of lower lobe 1–1.4 mm. long, lateral teeth 0.9–1 mm. long: corolla exceeding calyx; standard obovate, retuse, 2.6–2.8 mm. long; wings 2.6 mm. long; keel-petals 2.8–3.2 mm. long: loments stipitate, 2–3-articulate; stipes 1.4–3.4 mm. long, glabrous to minutely puberulent: articles 2.4–3.4 mm. long, 2–2.6 mm. wide, uncinulate-hispidulous, with opposite margins alternately involute and revolute.—Pl. 1, fig. B, 8, 9. Map 4.—*Desmodium exiguum* Gray in Smithson. Contrib. to Knowledge, v. art. vi. 46 (1853) (Pl. Wright. ii. 46 (1853)). *Meibomia exigua* (Gray) Ktze. Rev. Gen. i. 198 (1891). *Desmodium spirale* (Sw.) DC.,

var. *exiguum* (Gray) Robinson & Greenm. in Proc. Am. Acad. xxix. 385 (1894).—Southwestern United States, Mexico and northern South America.—UNITED STATES: Arizona: Greenlee County: Metcalf, September, 1900, *A. Davidson*, no. 448a, p.p. Cochise County: Bowie, September 16, 1884, *M. E. Jones*, no. 4238 (US). Pima County: Baboquivari Mts., September 24, 1929, *M. E. Jones*, no. 25022. Santa Cruz County: Nogales, September 15, 1929, *Harrison & Kearney*, no. 6027 (G, US). MEXICO: Baja California: San José del Cabo, September 20, 1890, *Brandegee*, no. 145. Sonora: under the shrubs on the sunny gravel mesa, Rio Mayo, San Bernardo, August 31, 1935, *Gentry*, no. 1653 (NY); "Mountain ravines, on the Sonoita, Sonora" (Pl. Wright. ii. 46) 1851, *Charles Wright*, no. 1010 (G, type; US, isotype); dry hillside 3 mi. E. of junction of Cananea and Remedios roads, about 15 miles east of Imuris, September 9, 1934, *Wiggins*, no. 7079. Jalisco: Bolaños, September 10–19, 1897, *J. N. Rose*, no. 2921 (G, NY). Oaxaca: vicinity of Cuicatlan, alt. 1800–2500 ft., October 8–24, 1894, *Nelson*, no. 1602 (G, US); Tomellin, September 4 & 5, 1905, *Rose, Painter & Rose*, no. 10103 (G, US). Guerrero: hill, Pungarabato, dist. Coyuca, October 1, 1934, *Hinton et al.*, no. 6693 (K), no. 6695 (G, K). COLOMBIA: Magdalena: prov. Santa Marta, alt. 100 ft., November, 1898–1901, *H. H. Smith*, no. 268 (G, NY); same province, on a dry hill near the sea, 4 miles s. of Gaira, *H. H. Smith*, no. 268a (NY).

Desmodium procumbens, varieties *transversum* and *exiguum* differ from the varieties *typicum* and *longipes* chiefly in the shape of the leaflets. The former two varieties are notable for the broadly transverse-elliptic basal leaflets which in var. *transversum* are also present on the upper portions of the plant but in var. *exiguum* are replaced by linear or linear-lanceolate leaflets above. A second character of differentiation is the possession of stipitate loments with stipes ranging in length from 1.4–3.6 mm. (2.2–3.6 mm. in var. *transversum* and 1.4–3.4 mm. in var. *exiguum*). In varieties *typicum* and *longipes* the loments are usually sessile and only occasionally substipitate. In distribution the two varieties under discussion and also var. *longipes* differ from variety *typicum* since they are known not at all from Jamaica or the West Indian Islands and only sparingly from Central America (except var. *longipes* which seems well represented there), whereas variety *typicum* was described from Jamaica and is wide-spread in the Islands.

D. neo-mexicanum Gray. Herbaceous, much branched from

base, approaching *D. procumbens* in aspect; branches grooved or subangulate, sparsely to densely uncinulate-puberulent: leaves chiefly trifoliolate, the lowermost often unifoliolate, petiolate: petioles striate, moderately to densely uncinulate-puberulent, 0.7–5.4 cm. long: petiolules 0.6–1.8 mm. long, darker than the petioles, pilose, more densely so on the upper surface: leaflets linear-lanceolate to ovate, rhombic- or more often, lance-ovate, long-acuminate, obtuse and mucronulate at tip, base cuneate to suborbicular; lateral and terminal leaflets similar, the latter somewhat larger, lateral 1.1–5.2 cm. long, 0.18–6.4 cm. broad, terminal 1.2–6 cm. long, 0.32–1.5 cm. broad, margins slightly revolute, ciliate, brightish green, glabriusculous to moderately strigose on upper surface, paler and sparsely to densely strigose below, often uncinulate-puberulent chiefly on midrib and veins of both surfaces: stipules striate, ciliate, obliquely ovate-acuminate, usually long-attenuate (1.4–) 2.5–4.4 (–6) mm. long: stipels ciliate, subulate or linear-lanceolate, 0.5–1.6 mm. long: inflorescence racemose-paniculate, rachises subangulate, rather densely uncinulate-puberulent: bracts persistent, becoming reflexed at maturity of loment, the primary striate, ciliate, ovate-lanceolate, apex long-attenuate; secondary bracts striate, ciliate, linear to linear-lanceolate or subulate, (1.6–) 2–3.6 (–4.5) mm. long: pedicels uncinulate-puberulent (densely so in flower, less so in fruit) 0.72–1.25 cm. long in flower, 0.8–2 cm. long in fruit: calyx moderately pilose and uncinulate-puberulent; upper lobe bifid, 1.2–1.8 mm. long; central tooth of lower lobe 1.4–1.8 mm. long, lateral teeth 1.4–1.5 mm. long: corolla somewhat longer than calyx; standard obovate, slightly retuse, base cuneate, 2.5 mm. long, 2 mm. broad; keel-petals subfalcate, unguiculate, about 2.6 mm. long; wings rather shorter than keel-petals, unguiculate, about 2.1 mm. long: loment (2–) 4–5-articulate, sessile to substipitate (occasionally stipitate); articles rhomboid, reticulate, densely pilose and uncinulate-hispidulous when young, becoming less pilose at maturity, 3–4 (–4.3) mm. long, (2.2–) 2.8–3 mm. wide; sutures slightly revolute to much folded; terminal article usually orbicular or suborbicular, 3.2–4 mm. long, 2.8–3.2 mm. wide.—Pl. 1, fig. C, 1–9. Map 5.—*D. Neo-Mexicanum* Gray in Smithson. Contrib. to Knowledge, iii. art. v. 53 (1852) (Pl. Wright. i. 53). *Meibomia neomexicana* (Gray) Ktze. Rev. Gen. i. 198 (1891). *M. Nova-Mexicana* Vail in Bull. Torr. Bot. Cl. xix. 116 (1892) [as a correction for *M. neomexicana* (Gray) Ktze., which she quoted as "*M. Neo-Mexicana*"]. *D. Bigelovii* Gray, op cit. v. art. vi. 47 (1853) (Pl. Wright. ii. 47). *D. neo-mexicanum* Gray, var. *Bigelovii* (Gray) Watson, Bibl. Ind. 217 (1878). *M. Bigelowii* (Gray) Ktze. op. cit. 197. *D.*

spirale (Sw.) DC., var. *Bigelovii* (Gray) Robins. & Greenm. in Proc. Am. Acad. xxix. 385 (1894). *Meibomia Hoehneana* Schindl. in Rep. Spec. Nov. Reg. Veg. xx. 151 (1924). *M. Lilloana* Schindl. op. cit. 152. *Desmodium Lilloanum* (Schindl.) Burkart in Darwiniana, iii[2]. 196 et fig. 11h on p. 207 (1939). *M. spiralis* sensu Hoehne in Anex. Mem. Inst. Butantan Bot. i. 50 (1921) as to specimen cited, *Lillo*, no. 4436, not (Sw.) O. Ktze. *Meibomia humilis* Schindler loc. cit. *Desmodium humile* (Schindl.) Burkart op. cit. 198. *Meibomia parva* Schindl. op. cit. 153. *Desmodium parvum* (Schindl.) Standl. in Field Mus. Pub. Bot. xi. 160 (1936).—Southwestern United States, south into Mexico and in regions of rather high altitude in Peru, Bolivia and Argentina.—UNITED STATES: Texas: El Paso County: expedition from western Texas to El Paso, October 12, 1849, *Charles Wright*, no. 141 (G, TYPE; US, ISOTYPE). Presidio County: Capote Creek, west Texas, *Havard*, no. 22. New Mexico: Socorro County: Mangas, September 9, 1897, *Metcalfe*, s.n. (US). Dona Ana County: Organ Mts., altitude 4800 ft., September 1, 1897, *Wooton*, no. 433 (cited by Schindler as *Meibomia parva*); Organ Mts., approximately 6000 ft. alt., September 23, 1906, *Wooton & Standley*, s.n. (US). Grant County: Pinos Altos Mts., September 8, 1880, *E. L. Greene*, s.n., p.p. (US). Arizona: Greenlee County: Clifton, Blue River, September 1, 1903, *A. Davidson*, no. 1339. Cochise County: Sander's Pasture, Turkey Cr., Chiricahua Mountains, alt. 5500 ft., August 30, 1907, *Blumer*, no. 2084; Chiricahua Mountains, Paradise, Slope II, aspect N., alt. 5550 ft., September 17, 1907, *Blumer*, no. 1675 (G, NY, US; cited by Schindler as *Meibomia parva*). [Pinal or Gila County:] plateau between Superior and Miami, about 5000 ft., September 8, 1929, *Kearney*, no. 6011. Pima County: Manning Trail, Rincon Mts., alt. 5800 ft., September 13, 1909, Blumer, no. 3344 (cited by Schindler as *Meibomia humilis*); Sonoita Valley, 5500 ft. alt., August, 1874, *Rothrock*, no. 663. Santa Cruz County: Patagonia Mts., September 15, 1929, *Harrison & Kearney*, no. 6051 (G, US). Yavapai County: mountain above Prescott, September, 1929, *Knoche*, s.n. MEXICO: Chihuahua: shaded places, rocky hills near Chihuahua, September 16, 1885, *Pringle*, no. 612 (G, NY p.p., US; cited by Schindler as *Meibomia parva*). Sonora: mountains, Tenajo de San Estaban, September 3, —, Mexican Boundary Survey, no. 277 (G, NY; cited by Schindler as *Meibomia humilis*); valley on the San Pedro, *Charles Wright*, no. 1012 (G, type of *D. Bigelovii;* NY, US (spec. no. 48549) isotypes). Sinaloa: Mazatlan, La Noria, alt. 150 m., December, 1925, *Ortega*, no. 6095. Durango: at the city of Durango and vicinity, April to November, 1896, *E. Palmer*, no. 584 (G, NY;

cited by Schindler as *Meibomia parva*); along road between Cerro Prieto and La Providencia, September 11, 1898, *Nelson*, no. 4963 (G, US). San Luis Potosí: chiefly in the region of San Luis Potosí, 22° N. lat., 6000–8000 ft. alt., 1878, *Parry & Palmer*, no. 181; *J. G. Schaffner*, no. 575 (NY; cited by Schindler as *Meibomia parva*). Aguascalientes: near city of Aguascalientes, October 9, 1903, *Rose & Painter*, no. 7710 (US). Hidalgo: valley near Dublan, 6800 ft. alt., September 23, 1901, *Pringle*, no. 9458 (G, US; cited by Schindler as *Meibomia parva*). Guanajuato: León, September 29, 1906, *J. N. & J. S. Rose*, no. 11505 (NY). Mexico: in the water, Tejupilco, dist. Temascaltepec, 1340 m. alt., September 30, 1932, *Hinton*, no. 1927 (K). Federal District: Pedrigal, Valley of Mexico, September 3, 1896, *Pringle*, no. 7684. Puebla: vicinity of San Luis Tulitlanapa, near Oaxaca, September, 1909, *Purpus*, no. 4092 (G, NY, US, isotypes of *Meibomia Hoehneana* Schindl.); Tehuacan, September, 1911, *Purpus*, no. 5646. PERU: Lima: San Bartolomé, on the Lima-Oroya-Railroad, 1500–1600 m. alt., April, 1910, *Weberbauer*, no. 5282 (US; cited by Schindler as *Meibomia humilis*). BOLIVIA: La Paz: prov. Larecaja, viciniis Sorata, ad rivulum Mausani, in schistosis, 2690–2800 m. alt., February–March, 1860, *Mandon*, no. 740 (NY; cited by Schindler as *Meibomia parva* and by Burkart as *D. Lilloanum*); same locality, 2600–3100 m. alt., March–April, 1861, *Mandon*, no. 739 (G, NY; cited by Schindler as *Meibomia parva* and by Burkart as *D. Lilloanum*). Cochabamba: Parotani, 2400 m. alt., March 20, 1892, *O. Kuntze*, s.n. (NY). Tarija: 2000 m. alt., April, 1904, *Fiebrig*, no. 2849 (G, US; cited by Schindler as *Meibomia parva* and by Burkart as *D. Lilloanum*). ARGENTINA: Tucumán: dept. Tafi, Sierra del Cajon, 1850 m. alt., May 1, 1926, *Venturi*, no. 4272 (G, US; cited by Burkart as *D. Lilloanum*); dept. Trancas, Vipos, 800 m. alt., March 30, 1922, *Venturi*, no. 1776 (US; cited by Burkart as *D. humile*).

Desmodium neo-mexicanum was described by Gray in 1852. The type of the species was numbered 141 by Dr. Gray on the label as well as in Plantae Wrightianae. In a pocket on the type-sheet in the Gray Herbarium is Wright's field-number 1305, by which the plant can be identified in his field-book where the data concerning locality is the same as that given by Gray, and the date of collection is given as October 12, 1849. This is unquestionably the type of the species, but it must not be confused with Wright's own number 141 which is also a *Desmodium*, collected in the early part of the same journey in an entirely different locality.

A year after describing *D. neo-mexicanum* Dr. Gray described a variety of it which he did not name, and also another species, *D. Bigelovii.* The variety is discussed in a later portion of the paper under the new species *D. Rosei* and is the plant which authors in general have called *D. neo-mexicanum.* Of *D. Bigelovii* Gray said: "From the wild specimens I was inclined to consider this a doubtful variety of D. Neo-Mexicanum; but in cultivation it proves to be distinct . . . the articles of the pod are thin, undulate and twisted; while in D. Neo-Mexicanum they are perfectly plane." The plant which Gray cited and annotated as *D. neo-mexicanum,* however, has the articles of the loment "thin, undulate, and twisted"[8] just as *D. Bigelovii,* while the variety has them "perfectly plane." For the unnamed variety a new name must be given, while for *D. Bigelovii,* published in 1853, the name *D. neo-mexicanum* must be taken up.

Although Watson and later Robinson and Greenman considered Gray's *D. Bigelovii* worthy of only varietal rank, Schindler, following Kuntze and Vail, considered it a distinct species and segregated from it his *Meibomia parva* and *M. humilis.* These two species as well as two others, *M. Lilloana* and *M. Hoehneana,* along with *D. Bigelovii,* I consider conspecific with *D. neo-mexicanum* in the sense in which I am now treating it (i. e. including *D. Bigelovii* and quite distinct from *D. procumbens* (Sw.) DC.) and the discussion which follows is an attempt to make clear the reasons for this decision.

In 1924 Schindler described, in one paper,[9] *Meibomia Hoehneana, M. Lilloana, M. parva* and *M. humilis. M. Hoehneana* was based on *Purpus,* no. 4092 from Puebla in Mexico. *M. Lilloana* was based on *Lillo,* no. 4436, collected in Argentina. *M. parva* and *M. humilis* were based on *D. spirale* (Sw.) DC., var. *Bigelovii* (Gray) Robinson & Greenman, in part, each as to certain specimens cited but not as to type. Essentially all the material cited by Schindler has been examined; in the case of *M. Lilloana* an excellent photograph of the type (Field Mus. Photo. no. 2916) has been studied and material cited by Burkart in his recent treatment of the species has been examined. In a later study Schindler,[10] treating his newly characterized sub-

[8] The twisted aspect, which is very slight here in comparison with the loments of the *D. procumbens* varieties, is due to the undulate margins of the articles of the loments. The spirally coiled appearance of the loments of the *D. procumbens* varieties is never attained.

[9] A. K. Schindler in Rep. Spec. Nov. Reg. Veg. xx. 151–153 (1924).

[10] A. K. Schindler, op. cit. xxii. 283 (1926).

genus, *Meibomia* subgenus *Cyclomorium* (Walp.) Schindl., listed the species comprising it, among which were the four above-mentioned and *Meibomia Bigelovii* (Gray) Ktze.[11] These, then, are the five entities here to be considered, which I am treating as *Desmodium neo-mexicanum* Gray (not of authors generally).

A comparison of the type-specimens of the two species *D. neo-mexicanum* and *D. Bigelovii* shows that they agree in possessing the following characters: 1) trifoliolate leaves with leaflets broader at the base, 2) persistent bracts, 3) more or less rigid pedicels varying but little in length and 4) loment of thin articles with undulate margins and a tendency for the terminal article to be orbicular. The specimens disagree in that 1) the leaflets of *D. neo-mexicanum* are much smaller, more prominently reticulate, and more usually acuminate than those of *D. Bigelovii;* and 2) the terminal articles of the loments of *D. neo-mexicanum* are glabrous whereas those of *D. Bigelovii* are pubescent.

The character of the leaflets seems taxonomically insignificant because some leaflets of *D. neo-mexicanum* are not acuminate, the reticulation may well be correlated with the age of the specimen, and size of leaflets is scarcely a diagnostic character. As for the terminal article of the loment, this character will be discussed at greater length below; here it is sufficient to say that two specimens cultivated in the Harvard Botanic Garden, named by Dr. Gray, *Desmodium Bigelovii,* with the appended note "e sem. Wright," have *two* terminal articles of each loment glabrous. It may not be arbitrarily assumed that these plants were raised from seeds of the type; on the other hand, all indications are against their belonging to a different species.

The only authentic material of *Meibomia Hoehneana* is that on which the description is based and of which the present author has seen three collections (G, NY, US). The measurable differences between this species and *D. neo-mexicanum* are negligible, the actual differences between the two type-collections are: 1) a rather dense patent-pilosity on the basal portions of some of the stems of *Purpus*, no. 4092 and 2) two terminal articles on each loment are glabrous rather than one as in *D. neo-mexicanum*.

The articles of the loment are characterized as being pubescent when immature and glabrous in age. On the specimens studied even the most immature loments have two terminal articles

[11] *Meibomia neomexicana* (Gray) Ktze. was also included in the subgenus.

glabrous, the remaining articles pubescent; more mature loments present precisely the same condition.

In addition to a photograph of the type-specimen the following material of *Meibomia Lilloana,* cited by Burkart in his excellent treatment of *Desmodium* of Argentina, has been seen: *Venturi,* no. 4272; *Mandon,* no. 739 and 740; *Fiebrig,* no. 2849. *Mandon,* no. 740 was cited by Schindler as *M. parva* (and a sheet of this number from the New York Botanical Garden is so annotated in Schindler's hand). This collection is composed of small plants with small leaflets; *Mandon,* no. 739 (also cited by Schindler as *M. parva*) on the other hand, is a rather mixed collection made up of several sheets of tall, large-leaved specimens and one sheet of small specimens with small leaflets. The specimens which could be considered a good match for the type of *M. Lilloana,* then, are *Mandon,* no. 739 (p. max. p.), and the Venturi specimen no. 4272. This material, though of greater size, agrees remarkably well with the type of *D. neo-mexicanum.* The leaflets are not prominently reticulate but they are of firm texture and long-acuminate as in the latter species. The other specimens differ from *M. Lilloana* in their small habit and from that species and *D. neo-mexicanum* in their leaflets, although they agree with both species in character of flowers, fruit and pubescence.

The greater part of the material cited under *M. parva* has been examined, including the specimens mentioned above under *M. Lilloana.* In respect to habit the material is by no means uniform. A characteristic of the species, according to the original diagnosis, is the glabrous terminal article of the loment; the second specimen cited, however, *Wooton,* no. 433 from the Organ Mts. in Dona Ana County, New Mexico, has the terminal articles pubescent (at least on the specimen of this number in the Gray Herbarium). The remainder of the material varies from the large plants with linear-lanceolate, long-acuminate leaflets (as in the type of *M. Lilloana*) to smaller plants with smaller, shorter linear-lanceolate or ovate to rhombic leaflets. The common characteristics of this material are the glabrous terminal articles of the loments, the characters of flowers and fruit in general, as well as agreement in character of bracts, stipules and pubescence, in which respect it agrees well with *D. neo-mexicanum, D. Bigelovii, M. Lilloana* and in part with *M. Hoehneana.*

M. humilis is similar to *M. parva* in almost all characters (including variability) except the terminal article of the loment, which in *M. humilis*, is pubescent. The specimens examined seem to agree in general in all diagnostic characters with the type of *D. neo-mexicanum*. The leaflets, particularly in the specimens cited by Schindler, *Mex. Bound. Surv.*, no. 277 and *Blumer*, no. 3344, agree especially well with the latter species.

It seems best to consider here the taxonomic value of the character of the terminal article of the loment. So far as an individual plant is concerned this character seemed, at first, to be constant; some loments may have more than one article glabrous, but the conclusion reached from all the material examined is, that a plant with one (or two) glabrous article terminating any single loment has all its loments so terminated; whereas plants with completely pubescent loments possess this condition throughout. Collections made during the past summer by Mr. Stephen S. White and referred to the author for determination by Dr. Ivan M. Johnston, however, disproved this conclusion. White's no. 2621 is composed of three typical plants, one of which possesses loments all terminated by glabrous articles, a second has loments composed of completely pubescent articles, and the third has *one* loment (with style still persistent) with all articles *pubescent* and the rest with terminal articles glabrous. The character cannot be correlated with any other; it is definitely not a function of habitat nor of geographical occurrence, and from all evidence the problem involved seems to be genetic rather than taxonomic. Another significant series of plants, composed of two collections of several plants each, was referred to the author by Dr. Johnston[12] in the autumn of 1938. Each of these collections seemed perfectly uniform in all characters, and from the aspect of the plants one might well assume that they grew in closest proximity. However, in each of the collections one plant has loments with glabrous terminal articles while the others have them with articles all pubescent. This seems to indicate clearly that regardless of locality or habitat the factor involved

[12] The following citations are of the specimens collected by White and Johnston in 1938 and 1939: MEXICO: SONORA: Cañon de Huepari, north of Aribabi (loop of Rio Bavispe), northeastern Sonora, September 2–3, 1939, *S. S. White*, no. 2621 (G). CHIHUAHUA: 11 miles NE of Camargo, shade of bushes about lava cliff (road from Camargo northeast to Mesteñas) September 24, 1938, *Johnston*, no. 7899 (G). ZACATECAS: 7 miles SE of Pinos in shelter of large cacti (road from Zacatecas east to San Luis Potosi (via Pinos)), September 6–8, 1938, *Johnston*, no. 7487 (G).

in the possession or lack of pubescence of the loment may play its part.

	terminal article glabrous	bracts persistent	stems uncinulate pubescent	leaflets: prominently reticulate	leaflets: long-acuminate	leaflets: firm in texture
D. neo-mexicanum[13]	√	√	√	√	√	√
D. Bigelovii	×	√	√	×	×	×
M. Hoehneana	√	√	in part	√	in large part	in large part
M. Lilloana	√	√	√	×	√	√
M. humilis	×	√	√	in large part	in large part	in part
M. parva	√	√	√	×	×	×

[13] Explanation of table:

1) *Desmodium neo-mexicanum* is the species with which the others are being compared.

2) A check mark (√) signifies possession of the character indicated at the head of the column.

3) An × signifies lack of the character indicated at the head of the column.

From the accompanying table it may be concluded that:

1) *D. Bigelovii* and *M. humilis* differ from *D. neo-mexicanum* in having the terminal article of the loment pubescent. This we feel is not a diagnostic character nor of any real taxonomic significance.

2) Persistent bracts characterize all the entities.

3) Uncinulate-puberulent stems are the general type.

4) The leaflets in many plants are similar to those on the type-specimen of *D. neo-mexicanum* and in those which differ the differences are of degree rather than kind.

In consideration of these observations it seems justifiable to reduce the five species considered and treat them as synonyms of *Desmodium neo-mexicanum*.

D. **Rosei,** sp. nov., herbacea vel suffrutescens: caule simplice vel basi ramoso: ramis ramulisque basi striatis mox angulatis, uncinato-hispidulis et cum pilis paucis uncinatis longioribus crassioribusque: foliis trifoliolatis, petiolatis: petiolis 0.9–3.5 cm. longis, plerumque tenuibus, striatis vel valde costatis vel angulatis, ut caulis uncinato-puberulentibus vel -pubescentibus: petiolulis 0.6–2.2 mm. longis, plus minusve angulatis, moderate vel dense strigosis et uncinato-hispidulis: foliolis linearibus vel lineari-lanceolatis, apice mucronulatis, obtusis vel subacutis (rarius acuminatis), basi subacutis vel truncatis; marginibus paulo revolutis, pilis albis, rigidis, ciliatis, supra subtusque strigosis pilis ciliis similibus et etiam uncinato-puberulentibus: nervo medio et venis primariis plerumque subtus prominentibus, venis marginem non attingentibus; foliolo terminali 1.5–7.5 cm. longo, 0.16–0.55 cm. lato, foliolis lateralibus 0.6–5.6 cm. longis; 0.1–0.45 cm. latis: stipulis 0.1–0.32 cm. longis prominenter striatis, supra subtusque uncinato-hispidulis et strigosis, marginibus ciliatis, ciliis longis, rectis, rigidisque; basi lineari-lanceolatis vel etiam late dilatatis subcordatisque, abrupte in laminam angustam contractis vel gradatim attenuatis: stipellis 0.08–0.12 cm. longis, subulatis vel lineari-lanceolatis, saepe cum nervo unico prominente, sparse vel dense uncinato-hispidulis et strigosis: inflorescentia racemoso-paniculata, racemis primariis praecipue terminalibus; rhachibus plus minusve angulatis molliter uncinato-puberulentibus vel -pubescentibus: bracteis et primariis et secundariis longe persistentibus, primariis 0.16–0.4 cm. longis, stipulis venis indumentoque similibus, secundariis 0.1–0.28 cm. longis subulatis vel lineari-lanceolatis, indumento primariis similibus: pedicellis 0.56–2.4 cm. longis, molliter uncinato-hispidulis ut rhachis: floribus parvis, ca. 2–3 (–4.2) mm. longis; calice piloso, pilis rectis, rigidis et brevi-uncinatis intermixtis; tubo 0.8–1 mm. longo; dente centrali lobi inferioris 0.6–2 mm. longo, lobo superiore bifido 1.8–2 mm. longo: corolla duplo vel triplo longiore; vexillo 3 mm. longo, suborbiculato, basi subtruncato apice retuso; alis 2.4–3.4 mm. longis ellipticis breviunguiculatis, basi apiceque obtusis; carina alis aequante; petalis carinae semi-ellipticis, brevi-unguiculatis: lomento brevi-stipitato, stipite 1.2–1.6 cm. longo, praecipue in suturis sparse vel moderate piloso, pilis rigidis rectisque; articulis 3 vel 4 planis, orbiculatis (rare oblique semi-orbiculatis), reticulatis, 3–4.5 mm. longis, 2.5–3.6 mm. latis.—Tab. 1, fig. A, 1–9. Map 6.—*Desmodium Neo-Mexicanum* sensu auctt. plur. *D. Neo-Mexicanum* Gray, var. [without name] in Smithsonian Contrib. to Knowledge, v. art. vi. 47 (1853) (Pl. Wright. ii. 47). *D. "Neo-Mexicana,"* var. *glabellum* Vail in Bull. Torr. Bot. Cl. xix. 116 (1892) in synon.

[incorrectly attributed to Gray, loc. cit.] as to plant cited by Gray, loc. cit., without name. *D. Neo-Mexicanum,* var. *glabellum* Vail sensu Schindler [also incorrectly attributed to Gray] in Fedde, Rep. Spec. Nov. Reg. Veg. Beih. xlix. Lfg. ii. 285 (1928) in synon.—Southwestern United States and northern Mexico.—UNITED STATES: New Mexico: Socorro County: west fork Gila River, Gila Forest, September 20, 1919, *Eggleston,* no. 16060, p.p.; Mangas, September 9, 1897, *Metcalfe,* s.n. (US). Grant County: Noonday Canyon, western slope, Black Range, Gila Forest (Kingston-Mimbres trail), October 10, 1919, *Eggleston,* no. 16368. [Probably] Grant County: borders of thickets on stony hills along the Coppermine Creek, 1851, *Charles Wright,* no. 1011 (G, type; US, isotype); Coke Cañon [and] Coppermine, August, 1851, *Thurber,* no. 1072 (G, one sheet for each locality, same number); 1881, *G. R. Vasey,* s.n. Arizona: Greenlee County: Metcalf, September, 1900, *A. Davidson,* no. 447 (D) and no. 447a (G). Cochise County: Chiricahua Mts., Paradise Slope II, alt. 5550 ft., September 17, 1907, *Blumer,* no. 1675 (D, G, US); Huachuca Mts., Lanner Canyon, August 24, 1910, *Goodding,* no. 801 (G, US). [Pinal or Gila County:] plateau between Superior and Miami, southern Arizona, September 8, 1929, *Kearney,* no. 6012. Pima County: Rincon Mts., Manning Trail, alt. 5800 ft., September 13, 1909, *Blumer,* no. 3345. Santa Cruz County: near Washington, Patagonia Mts., September 16, 1934, *Kearney & Peebles,* no. 10160 (D). Yavapai County: mountains near Prescott, September, 1929, *Knoche,* s.n., p.p. (D). MEXICO: Chihuahua: between Colonia Garcia and Pratt's Ranch below Pacheco, August, 1899, *Nelson,* no. 6280 (G, US), hillsides near Guerrero, September 10, 1887, *Pringle,* no. 1224 (G, P, p.p.). Sonora: between Batoco and Sta. Cruz, September, 1851, *Thurber,* no. 1018. Zacatecas: near Conception del Oro, August 11–14, 1904, *E. Palmer,* no. 288 (G, NY, US).

Desmodium Rosei, until now unnamed and only partially described, is a well-known plant which has, for many years, been known as *D. neo-mexicanum* A. Gray. The plant so named by Gray, however, *Wright,* no. 141, was actually conspecific with his later *D. Bigelovii,* for which species the name must be taken up as already explained. *D. Rosei,* the usually small, herbaceous or suffrutescent plant with essentially linear, usually thin, tri- foliolate leaves and short-stipitate loments of three to four orbicular articles, is quite different from *D. neo-mexicanum.* The plant which Dr. Gray had before him had shorter coarser leaflets usually broader at the base than apex, substipitate loments with

(one-) two to four articles of rhomboidal outline and undulate margins.

Desmodium neo-mexicanum, var. *glabellum* was first published, in synonymy, by Vail in Bull. Torr. Bot. Cl. xix. 116 (1892) under *Meibomia Bigelovii* (Gray) Ktze., a disposition which seems to be taxonomically incorrect for the plant cited by Gray. The name was published again, as a synonym of *Meibomia neo-mexicana* (Gray) Ktze., by Schindler who, following Miss Vail, also incorrectly attributed the name to Dr. Gray (in Pl. Wright. ii. 47 (1853)). Other students of the genus have treated *Wright*, no. 1011, as "var. *glabellum*" and have so annotated the specimens. The fact is, as Blake (1923, in herb.) indicated on the Wright specimen in the U. S. National Herbarium, that Gray never published a var. *glabellum*. On page 47 of Plantae Wrightianae Dr. Gray described and discussed a plant which he considered a variety of *D. neo-mexicanum*, but he did not name it. The varietal epithet "glabellum" which Vail proposed was the first word of Gray's description rather than a new name. That Gray was not publishing a new variety may be inferred both from the punctuation and the typography of his paper. In all cases where Dr. Gray has discussed a named entity or proposed a new entity by name, the epithet is printed in small capitals and, furthermore, all new names are followed by a colon. For example, on page 32 (Pl. Wright. pt. ii) a specimen is cited under *Phaseolus acutifolius;* however, no latin diagnosis or emendation is given and no colon is used. On page 33, *P. acutifolius*, var. *tenuifolius* is described as a new variety and immediately following the varietal epithet a colon *is* used. Just above the new variety (*tenuifolius*), however, another variety is treated but not named; here a semicolon is used after the specific epithet, preceding the word "var." and subsequent description. Similar cases of unnamed varieties may be found, in pt. i, on page 45 under *Indigofera leptosepala*, on page 69 under *Oenothera albicaulis*, on page 70 under *Oenothera speciosa;* in pt. ii, on page 26 under *Rutosma texanum*, on page 37 under *Dalea frutescens* and so forth.

The name *Desmodium neo-mexicanum*, var. *glabellum*[14] is invalid, therefore, because it was published in synonymy. Taxonomically the entity typified by Wright's specimen no. 1011, from "borders of thickets, on stony hills along the Coppermine

[14] In any case the combination *D. glabellum* is preoccupied.

Creek, New Mexico," is our species, *D. Rosei*, and I have chosen the specimen of this number in the Gray Herbarium as type.

It is a pleasure to follow the suggestion of Mr. C. V. Morton, of the U. S. National Herbarium, in naming this species for the late Dr. J. N. Rose who, many years ago, made the distinction between Gray's plant and the large group of specimens incorrectly named *D. neo-mexicanum*.

D. **Wigginsii,** sp. nov., herbacea, annua: caule e basi ramoso; ramis striatis mox angulatis, sparse vel moderate pilosis pilis patentibus subuncinatisque; foliis trifoliolatis, petiolatis: petiolis tenuibus, angulatis, 1.8–6 cm. longis, moderate uncinato-hispidulis pilis longis vel brevibus: petiolulis 1.6–2 mm. longis, uncinato-hispidulis paucis pilis longis rectisque intermixtis: foliolis mucronulatis, tenuibus, lineari- vel ovato-lanceolatis, basi (in foliolis lateralibus oblique) rotundatis, apice acutis vel acuminatis; foliolo terminali 3–7 cm. longo, 0.7–2.5 cm. lato; foliolis lateralibus 1.8–4.6 cm. longis, 0.6–1.7 cm. latis, supra uncinato-hispidulis pilis longis rectisque sparse intermixtis praecipue in nervo medio venisque, subtus densius et quidpiam pallidius pubescentibus, marginibus paulo revolutis pilis rectis ciliatis, venis utraque pagina saepe conspicua reticulatis: stipulis 2–2.5 mm. longis, lineari-lanceolatis, basi latis abrupte in laminam angustam contractis, plus minusve ciliatis saepe omnino reflexis: stipellis longe persistentibus, 0.8–2.4 mm. longis, subulatis, longe attenuatis, sparse ciliatis: inflorescentia racemoso-paniculata, racemis axillaribus terminalibusque; rhachibus angulatis, uncinato-hispidulis: bracteis primariis secundariisque similibus; primariis 1.4–2.6 mm. longis, secundariis 1 mm. longis, lanceolatis, longe attenuatis, striatis, sparse pilosis, ante maturitatem florum deciduis sed basi inflorescentiarum individuarum saepe persistentibus: pedicellis 0.6–1.3 cm. longis, pubescentibus pilis rectis uncinatisque intermixtis: floribus parvis; calice moderate strigoso et uncinato-hispidulo, 1.4–2 mm. longo (ex basi tubi ad apicem dentis centralis lobi inferioris); lobo superiore subbifido: corolla circa duplo longiore; vexillo 3.2 mm. longo, 3 mm. lato, obovato, basi obtuso; alis 2.8 mm. longis, 1 mm. latis, oblique suboblongis, brevi-unguiculatis; petalis carinae 3.8 mm. longis, 1.4 mm. latis, cuneatis, falcatis, apice oblique rotundatis cohaerentibus marginibus contiguis, unguiculatis: lomento 2–4-articulato; articulis 4.5–7 mm. longis, reticulatis, praecipue in suturis uncinato-hirsutis, in formam rhomboideam contortis terminali excepto, hoc non contorto, 7–8.5 mm. longo, 4–5 mm. lato, ambitu triangulari.—Tab. 2, fig. A, 1–7. Map 7.—*D. Metcalfi* M. E. Jones in Contrib. West. Bot. xvi. 4 (1930).

nomen nudum, non *D. Metcalfei* (Rose & Painter) Kearney & Peebles.—UNITED STATES: Arizona: Pima County: Baboquivari Mts., September 19, 1929, *M. E. Jones*, no. 24903 (G, NY); same locality and date, *M. E. Jones*, no. 24904, p.p. MEXICO: Sonora: along Rio Magdalena 8 mi. E. of Nogales-Hermosillo highway, on road from Imuris to Cananea, September 9, 1934, *Wiggins*, no. 7045 (G, *type*).

Desmodium Wigginsii, named for Dr. Ira L. Wiggins of Stanford University, California, may be distinguished from its closest relatives (*D. procumbens* and *D. neo-mexicanum*) chiefly by the shape of its leaflets and the striking triangular terminal article of each loment. The specimens collected by Marcus E. Jones as number 24903, were distributed under the name of "Desmodium Metcalfi" and mentioned by that name in the account of his Arizona collecting-trip (Contrib. West. Bot. xvi. 4 (1930)). The name obviously referred to *Meibomia Metcalfii* Rose & Painter (which Kearney and Peebles have recently properly combined under *Desmodium* as *D. Metcalfei*, in Journ. Wash. Acad. Sci. xxix. 485 (1939)) to which our species is not at all closely related.

B. Miscellaneous Notes and Records

D. **tenuipes** (Blake) comb. nov.—*Meibomia tenuipes* Blake in Bot. Gaz. lxxviii. 285, pl. iv, fig. 8 (1924).

Var. **typicum.**—Pl. 2, fig. B, 1–7.—GUATEMALA: Huehuetenango: between Jacaltenango and San Martín, alt. 1615–2135 m., December 24, 1895, *E. W. Nelson*, no. 3604 (G, photo., US, type (nos. 252310 and 252311)). Sololá: January 31, 1915, *Holway*, no. 163 (US).

Var. **glabrescens,** var. nov., a var. typica recedit caule ca. 20 cm. longo, glabrescente: foliolis parvis, terminalibus 0.6–2.2 cm. longis, 0.5–1.35 cm. latis, lateralibus 0.9–2 cm. longis, 0.5–1.1 cm. latis, sparse strigosis: stipitibus calicis aequantibus.—Tab. 2, fig. B, 8 & 9.—GUATEMALA: Dept. Sacatepequez: dry, wooded slope near Santa Maria, 5500 ft., January 27, 1937, *F. W. Hunnewell*, no. 14699 (G, type).

Variety *glabrescens* differs from variety *typicum* in its general habit, which is smaller and more delicate, in its smaller, only sparsely strigose leaflets, and in its calyx which is as long as or longer than the stipe (in var. *typicum* the calyx is always exceeded by the stipe).

D. Hookerianum D. Dietr. Syn. Pl. iv. 1151 (1847). *D. podocarpum* Hook. & Arn. in Bot. Beech. Voy. 417, pl. xcvi (1841), non *D. podocarpum* DC. in Ann. Sci. Nat. iv. 102 (1825). *Meibomia Hookeri* Ktze. Rev. Gen. i. 197 (1891).

Of this rare species, described and well illustrated by Hooker and Arnott, I have seen only one specimen: MEXICO: Oaxaca: Guatalgo, October, 1842, *Liebmann*, no. 4792 (US). The affinities of the species are clearly with *D. tenuipes* from which it may be distinguished in the following manner:

Stipe about twice as long as the remnants of the stamen-tube (usually equal to pedicel in length); articles of loment small (about 2.5 mm. long and 2.5 mm. wide) and contorted. . *D. Hookerianum.*
Stipe exceeded by the remnants of the stamen-tube; articles larger (4–6.5 mm. long, 3–4.5 mm. wide) with sinuate or revolute margins.
Stipe exceeding calyx in length. ..... *D. tenuipes*, var. *typicum.*
Stipe equalling or shorter than calyx. .... *D. tenuipes*, var. *glabrescens.*

D. ANGUSTIFOLIUM (HBK.) DC., var. **typicum.**—*Hedysarum angustifolium* HBK. Nov. Gen. et Sp. vi. 404 (1823). *Desmodium angustifolium* (HBK.) DC. Prod. ii. 328 (1825). *Meibomia angustifolia* (HBK.) Ktze. Rev. Gen. i. 197 (1891) non *M. angustifolia* (T. & G.) Kearney in Bull. Torr. Bot. Cl. xx. 481 (1893).—Pl. 2, fig. C, 1–8. Map 8a.—Mexico and Central America to northern South America.—MEXICO: Chihuahua: Guasaremos, Rio Mayo, upper Sonoran, rocky oak slope, August 26, 1936, *Gentry*, no. 2460 (HG); same locality, rocky terrain, oak-pine slope, August 26, 1936, *Gentry*, no. 2474 (HG); Batopilillas, Rio Mayo, upper Sonoran, oak savanna, among rocks, September 8, 1936, *Gentry*, no. 2623, p.p. (T). Sonora: Sierra Charuco, Rio Mayo, upper Sonoran, pine slopes, on the sunny rocky slopes, September 10, 1935, *Gentry*, no. 1747 (HG). Sinaloa: vicinity of Culiacan, Cerro Colorado, November 5, 1904. *Brandegee* (G). Durango: Angust 14, 1897, *J. N. Rose*, no. 2271 (G). San Luis Potosí: bluffs of barranca, Las Canoas, August 22, 1891, *Pringle*, no. 5013 (G). Vera Cruz: dry meadows, Zacuapan, August, 1906, *Purpus*, no. 6088. Nayarit: near Tepic, roadside along Puga road, November 5, 1925, *Ferris*, no. 5805 (D). Jalisco: barranca near Guadalajara, October 5, 1889, *Pringle*, no. 2955; on the road between Colotlan and Bolaños, September 7–9, 1897, *J. N. Rose*, no. 2830 (G, NY, US). Mexico: Rincón del Carmen, Temascaltepec, alt. 1340 m., September 5, 1932, *Hinton*, no. 1611 (G, K). Morelos: near Cuernavaca, September 12, 1905, *Rose & Hough*, no. 10181 (NY). Chiapas: near Tuxtla, alt. 2400–2800 ft., September 1, 1895, *Nelson*, no. 3093; Hacienda, Monserrate, September, 1923, *Purpus*, no. 9150 (D, G). Guerrero: Taxco, July 21, 1937, *Abbott*, no. 272 (G). GUATEMALA: barrancas del riv. de las Vacas, alt. 1400 m., August, 1921, *Tonduz*, no. 841 (US). SALVADOR: Santa Ana: near Chalchuapa, 1922, *Calderón*, no. 978a. COSTA RICA:

CARTAGO: environs de Cartago, versant Atlantique, alt. 1417 m., October, 1894, *Biolley* (herb. Inst. Physico-Geogr. Nat. Cost.) no. 8979 (US). COLOMBIA: MAGDALENA: Santa Marta, alt. 500 ft., October, 1898–1901, *H. H. Smith*, no. 266.

Var. **gramineum** (Gray), comb. nov.—*Desmodium gramineum* Gray in Smithsonian Contrib. to Knowledge, v. art. vi. 46 (1853) (Pl. Wright. ii. 46). *Meibomia graminea* (Gray) Ktze. Rev. Gen. i. 198 (1891).—PL. 2, FIG. C, 9. MAP 8.—Arizona to Chihuahua and Sonora.—UNITED STATES: ARIZONA: Santa Cruz County: Sycamore Canyon, August 17, 1937, *L. N. Goodding*, s.n. (US); Patagonia Mts., southern Arizona, alt. 5000 ft., September 16, 1934, *Kearney & Peebles*, no. 10192 (US). Pima County: Sa. Catalina Mts., August, 1883, *Lemmon*, no. 1024. MEXICO: CHIHUAHUA: among rocks, upper Sonoran, oak savanna, Batopilillas, Rio Mayo, September 8, 1936, *Gentry*, no. 2623, p.p. (G, HG). SONORA: crevices of rocks on the Sonoita, near Deserted Rancho (according to Pl. Wright. ii. 46 (1853)), *Charles Wright*, no. 1009 (G, TYPE, NY & US, ISOTYPES).

Desmodium gramineum of Asa Gray has long been confused in herbaria with *D. angustifolium* (HBK.) DC., var. *typicum*. Its characteristics, however, seem to be perfectly definite, although not of sufficient strength to distinguish the entity as a species. In general aspect var. *gramineum* and var. *typicum* approach each other closely. In range var. *gramineum* is the more northern, occupying the northwesternmost portion of the range of the typical variety, with some few stations farther north (in Arizona) than any yet recorded for the latter. Variety *gramineum* may be distinguished from var. *typicum* by its leaflets, consistently more slender, by the type and amount of its vestiture, and especially by its much longer petioles and pedicels.

After careful examination of the type-specimen it is obvious that Dr. Gray's statement "These leaflets are . . . . perfectly glabrous, like the rest of the plant" needs emendation. The table below summarizes the diagnostic characters of the two varieties.

	Var. TYPICUM	Var. GRAMINEUM
Stem	Glabrescent to densely uncinulate-puberulent.	Glabrescent to moderately uncinulate-puberulent.
Leaflets	Sparsely to densely uncinulate-puberulent on both surfaces and sparsely strigose chiefly on the midrib and veins of the lower surface.	Minutely uncinulate-hispidulous on both surfaces and sparsely strigose chiefly on midrib and veins of the lower surface.
Petiole	0.2–1 cm. long.	(1–) 1.7–3 cm. long.
Rachis	Densely uncinate-hispidulous becoming slightly less so in age.	Sparsely and minutely hirtellous.
Pedicels	3.5–6.5 mm. long, uncinate-puberulent and sparsely strigillose.	11–16 mm. long, very moderately uncinulate-puberulent becoming sparsely so in age.
Loment	Densely uncinulate-hispid and sparsely to moderately strigillose.	Uncinulate-hispid and sparsely strigillose.

D. WYDLERIANUM Urban, Symb. Ant. ii. 302 (1900).—PL. 2, FIG. D, 1–7. MAP 9.—Central America, the West Indies and northern South America.—COSTA RICA: SAN JOSÉ: in forest, vicinity of El General, alt. 700 m., January, 1939, *Skutch*, no. 3913 (US). HISPANIOLA: HAITI: Massif de la Hotte, western group, Tiburon, Riv. Tiburon, at La Roche Percée, 150 m., August 28, 1928, *Ekman*, no. H. 10560 (US). PORTO RICO: parte orientale, *Wydler*, no. 140 (F, ISOTYPE, G, photo.). LESSER ANTILLES: GRENADA: Annandale, St. George's, March, 1906, *Broadway*, no. 1885 (F, NY). VENEZUELA: SUCRE: near the river, vicinity of Cristobal Colon, January 5–February 22, 1923, *Broadway*, no. 262 (G, NY); same locality, the Balcon, *Broadway*, no. 393 (G, NY).

This species, closely allied to *D. axillare* (Sw.) DC., is distinguished by its more delicate habit and by its very thin leaves with sinuolate margins. Of the collections cited by Urban, a specimen of the first, collected by Wydler (no. 140) for whom the species was named, and kindly loaned by Dr. C. C. Gregg of the Field Museum, I consider an isotype. *Eggers*, no. 5794, represented by a specimen from the U. S. National Herbarium is quite different, disagreeing with the original description in:

1) the leaflets which are rounded-obtuse at the base rather

than truncate or subcordate; 2) persistent stipules; 3) pedicels not always solitary; 4) long-stipitate loments.

Explanation of Plates 1 and 2[15]

Plate 1. Desmodium Rosei, n. sp.: [figs. A1–9] fig. 1, habit × 1/8, from *Wright,* no. 1011 (type); fig. 2, trifoliolate leaf, × 1, from the type; fig. 3, mature loment, × 2, from *Kearney,* no. 6012; fig. 4, mature loment, showing stipe and persistent style, × 2, from *Blumer* no. 3345; fig. 5, calyx, × 5, from *Kearney,* no. 6012; fig. 6, wing, × 5, from same specimen; fig. 7, diadelphous stamens (tube cut open), × 5, from same specimen; fig. 8, standard, × 5, from same specimen; fig. 9, keel petals, × 5, from same specimen.

D. procumbens (Mill.) Hitchc., var typicum: [figs. B1–7] fig. 1, portion of inflorescence with a trifoliolate leaf, × 1, from *Burchell,* no. 9092; fig. 2, mature loment, × 5, from *J. G. Jack,* no. 6581; fig. 3, keel petals, × 5, from *Harris,* no. 11852; fig. 4, standard, × 5, from same specimen; fig. 5, wing, × 5, from same specimen; fig. 6, diadelphous stamens (tube cut open), × 5, from same specimen; fig. 7, calyx, × 5, from same specimen.

Var. exiguum (Gray) Schubert: [figs. B8 and 9] fig. 8, upper portion of plant showing part of inflorescence and trifoliolate leaf with linear leaflets as well as broader unifoliolate leaves, × 1/2, from *Wright,* no. 1010 (type); fig. 9, mature loment, × 3, from the type.

Var. transversum (Robins. & Greenm.) Schubert: [figs. B10 and 11] fig. 10, habit, × 1/2, showing method of branching from base and also variation in leaf-shape, from *Pringle,* no. 5179 (type); fig. 11, mature loment, × 2, from *Hinton,* no. 1754.

Var. longipes (Schindl.) Schubert: fig. B12: mature loment × 5, from *Calderón,* no. 1432.

D. neo-mexicanum Gray: [figs. C1–9] fig. 1, habit, × 1/8, from *Wright,* no. 1012 (type of *D. Bigelovii*); fig. 2, trifoliolate leaf, × 1, from same specimen; fig. 3, mature loment, × 2, from same specimen; fig. 4, calyx, × 5, from *Harrison & Kearney,* no. 6051; fig. 5, diadelphous stamens (tube cut open), × 5, from same specimen; fig. 6, wing, × 5, from same specimen; fig. 7, standard, × 5, from same specimen; fig. 8, keel petals, × 5, from same specimen; fig. 9, mature loment showing glabrous terminal article, × 2, from *Venturi,* no. 4272 (in U. S. Nat. Herb.).

Plate 2. Desmodium Wigginsii, n. sp.: [figs. A1–7] fig. 1, portion of inflorescence and one trifoliolate leaf, × 1, from *Wiggins,* no. 7045 (type); fig. 2, mature loment, showing triangular terminal article, × 2, from the type; fig. 3, calyx, × 5, from the type; fig. 4, diadelphous stamens (tube cut open), × 5, from the type; fig. 5, keel petals, × 5, from the type; fig. 6, wing, × 5, from the type; fig. 7, standard, × 5, from the type.

D. tenuipes (Blake) Schubert, var. typicum [figs. B1–7] fig. 1, portion of inflorescence and one trifoliolate leaf, × 1, from *Nelson,* no. 3604 (type in U. S. Nat. Herb.); fig. 2, mature loment, × 2, from *Holway,* no. 163; fig. 3, calyx, × 2, from the type; fig. 4, diadelphous stamens (tube cut open), × 2, from the type; fig. 5, keel petals, × 2, from the type; fig. 6, wing, × 2, from the type; fig. 7, standard, × 2, from the type.

Var. glabrescens, n. var.: [figs. B8 and 9] fig. 8, portion of inflorescence and one trifoliolate leaf, × 1, from *Hunnewell,* no. 14699 (type); fig. 9, mature loment, × 2, from the type.

D. angustifolium (HBK.) DC., var typicum: [figs. C1–8] fig. 1, portion of stem showing unifoliolate leaves, × 1/4, from *Pringle,* no. 3836:

[15] The plates were drawn, under the author's direction, by Mr. Gordon W. Dillon.

FIG. 2, portion of inflorescence, × 1/2, from same specimen; FIG. 3, mature loment, × 2, from same specimen; FIG. 4, calyx, × 4, from same specimen; FIG. 5, keel petals, × 4, from same specimen; FIG. 6, wing, × 4, from same specimen; FIG. 7, standard, × 4, from same specimen; FIG. 8, diadelphous stamens (tube cut open), × 4, from same specimen.

Var. GRAMINEUM (Gray) Schubert: FIG. C9, mature loment, × 2, from *Wright*, no. 1009 (TYPE).

D. WYDLERIANUM Urban: [FIGS. D1–7] FIG. 1, habit, × 1/4, from *Wydler*, no. 140 (ISOTYPE, in herb. Field Mus.); FIG. 2, mature loment, from *Broadway*, no. 1885 (in herb. Field Mus.); FIG. 3, standard, × 5, from *Ekman*, no. H.10560; FIG. 4, wing, × 5, from same specimen; FIG. 5, calyx, × 5, from same specimen; FIG. 6, keel petals, × 5, from same specimen; FIG. 7, diadelphous stamens (tube cut open), × 5, from same specimen.

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2. STUDIES IN THE BROMELIACEAE—XI

By LYMAN B. SMITH

(Plate 3)

It is significant that the following new *Bromeliaceae* all come from northeastern Brazil. Since the days of Martius, botanical collecting in Brazil has concentrated increasingly on the region from Rio de Janeiro southward, with relative neglect of the northeastern states. As a result the yield of novelties in collections from the southeast has waned, while in the northeast it remains almost as good as it was a century ago.

In my own studies, the examination of hundreds of sheets of *Bromeliaceae* from southeastern Brazil has yielded five new species, while the nine numbers of this family which H. M. Curran collected in Bahia have provided an equal amount. Prof. Harms's descriptions of new species collected in Pernambuco by Dr. Pickel are further evidence along the same line. The work of Dr. A. A. da Silveira suggests a similar contrast between our knowledge of the southeast and of the high interior.

Last year with these facts in mind, Mr. and Mrs. Mulford B. Foster collected *Bromeliaceae* in Brazil with especial attention to the northeastern region. To date a study of their collections has yielded sixteen new species without completing the list. Equally important are the species of unknown origin or of century-long disappearance which they have rediscovered.

Cryptanthopsis navioides, spec. nov., acaulis, stolonibus elongatis procreans, per anthesin rubescens; foliis plurimis densissime squarroseque rosulatis, 3 dm. longis, vaginis parvis, haud dissimilibus, minutissime denseque serrulatis, laminis angustissime

triangularibus, ad 8 mm. latis, planis, utrinque dissite obscureque punctulato-lepidotis, spinis gracilibus 1 mm. longis subdense armatis; inflorescentia capitata, pauciflora, foliorum rosulae centro immersa; bracteis florigeris anguste triangularibus, serrulatis, interioribus quam sepala brevioribus; floribus sessilibus; sepalis liberis, rectis, symmetricis, anguste triangularibus, acuminatis, fere 3 cm. longis; petalis siccis albis, supra basin appendiculatis; ovario valde compresso, ad 5 mm. longo. Tab. 3, fig. 4–6.

BRAZIL: Bahia: on perpendicular rocks above stream in isolated ravine, Jacobina, alt. 500 m., June 16, 1939, *M. B. & R. Foster 90* (G, type).

Its numerous long and very narrow leaves distinguish this species at a glance from *C. saxicola*, the only other member of the genus.

Encholirium horridum, spec. nov., florifera ultra 2 m. alta; foliis multis, dense rosulatis, ad 7 dm. longis, vaginis reniformibus, latis, glabris, laminis angustissime triangularibus, longe acuminatis, planis, 3 cm. latis, spinis horridis ad 1 cm. longis subdense repando-serratis, supra laevibus glabris lucidisque, subtus valde nervatis et minutissime adpresseque albido-lepidotis; scapo erecto, valido, glabro; scapi bracteis anguste triangularibus, supremis quam internodia multo brevioribus; inflorescentia 5–6-ramosa, glabra; ramis patentibus, plus minusve decurvatis, ad 75 cm. longis; racemis sublaxe multifloris, longe stipitatis; bracteis florigeris parvis, triangularibus, acuminatis, quam pedicellos subduplo brevioribus; floribus patentibus; pedicellis graciliter obconicis, ca. 1 cm. longis, valde sulcatis; sepalis ovatis, 8 mm. longis; petalis delapsis solum cognitis, angustis, ad 2 cm. longis; staminibus verisimiliter quam petala brevioribus; capsulis ad 14 mm. longis, seminibus lateraliter longe caudatis. Tab. 3, fig. 1–3.

BRAZIL: Espirito Santo: in almost solid mat formation on smooth rock sloping from 45° to almost perpendicular, 3/4 of a mile from the sea, Victoria, alt. 15–90 m., July 12, 1939, *M. B. & R. Foster 193* (G, type).

This species stands alone in the genus on account of its branched inflorescence. The laterally caudate seed is also remarkable.

Hohenbergia brachycephala, spec. nov., e fragmentis solum cognita, ca. 1 m. alta (! Curran); foliis ultra 5 dm. longis, laminis ligulatis, late acutis, 5 cm. latis, utrinque obscure punctulato-lepidotis, margine minutissime laxeque serrulatis; scapo ignoto; inflorescentiae ramis solum cognitis, ad 29 cm. longis, capitulis 5 laxe racemoseque gerentibus; bracteis secundariis anguste tri-

angularibus, membranaceis, integris, basi sparse pallido-flocculosis, infimis quam ramos secundarios bene brevioribus; capitulis c spicis 2–3, ad 2 cm. longis, 3 cm. diametro; spicis paucifloris, sessilibus; bracteis florigeris e late ovatis acuminatis, ad 16 mm. longis, sepala immatura bene superantibus, serrulatis, coriaceis, leviter nervatis, obscure pallideque punctulato-lepidotis, carinatis; sepalis liberis, immaturis 8 mm. longis, valde asymmetricis, mucronatis, serrulatis, punctulato-lepidotis. Tab. 3, fig. 14–16.

BRAZIL: Bahia: forests of Rio Grongogy Basin, alt 100–500 m., Oct.–Nov., 1915, *H. M. Curran 121* (US, type; phot. G).

In the Pflanzenreich treatment of the *Bromeliaceae, Hohenbergia brachycephala* keys down to the vicinity of *H. caruaruensis*, but unlike that species it has the spikes in long-stipitate heads that are broader than long. Also its serrulate floral bracts and sepals set it off from most species of *Hohenbergia*.

Hohenbergia disjuncta, spec. nov., florifera ultra 8 dm. alta, stolonibus strictis robustis procreans; foliis dense rosulatis, 4–6 dm. longis, utrinque dense punctulato-lepidotis, vaginis magnis, latissime ellipticis, atro-castaneis, laminis ligulatis, late acutis, 8 cm. latis, spinis atris ad 4 mm. longis subdense armatis; scapo erecto, 47 cm. vel ultra longo, 6 mm. diametro, dense punctulato-lepidoto; scapi bracteis valde remotis, in specimine typico bractea unica oblonga acuta 7 cm. longa solum cognita; inflorescentia elongata, valde disjuncta; bracteis primariis patentibus vel reflexis, ea scapi similibus, dissite serrulatis, quam ramos axillares abortivos longioribus; spicis 2–5 in axillis corymbose aggregatis, crasse ellipsoideis, 3 cm. longis, nullo modo tomentosis; bracteis florigeris suborbicularibus, apiculatis pungentisque, quam sepala paulo brevioribus, obtuse carinatis, coriaceis, punctulato-lepidotis; sepalis late ovatis, obtusis, breve mucronatis, carinatis, 11 mm. longis; ovario 6 mm. longo, tubo epigyno subnullo; petalis staminibusque ignotis. Tab. 3, fig. 7–10.

BRAZIL: Bahia: Agua Preta, alt. 240 m., June 3, 1939, *M. B. & R. Foster 64* (G, type).

This new species is placed in *Hohenbergia* because of its cone-like spikes and very short epigynous tube, but without petals and stamens it is not sure that it belongs there. Its nearly naked scape and narrow elongate inflorescence give it a habit quite different from other species of *Hohenbergia*.

Hohenbergia littoralis, spec. nov., florifera metralis; foliis paucis, tubulose rosulatis, ultra 6 dm. longis, utrinque lepidibus minutis pallidis adpressis densissime obtectis, vaginis amplissimis,

laminis ligulatis, late acutis vel rotundatis apiculatisque, 10 cm. latis, subdense serrulatis, ad apicem versus purpureis, apice ipse mucro valido brunneo pungente armato; scapo erecto, gracili, per anthesin albido-flocculoso; scapi bracteis erectis, inferioribus quam internodia subduplo brevioribus, lanceolatis, acuminatis, adpresse albido-lepidotis; inflorescentia perabbreviata, e spicis 5 dense capitata, albido-flocculoso; bracteis primariis eis scapi similibus, quam spicas brevioribus vel infimas subaequantibus; spicis crasse ellipsoideis, 35–45 mm. longis; bracteis florigeris patentibus, e late ovatis acuminatis, mucronatis, valde nervatis, infimis ad 15 mm. longis, sepala subaequantibus; sepalis ovatis, asymmetricis, mucro valido incluso ad 9–11 mm. longis; petalis delapsis solum cognitis; ovario valde compresso, tubo epigyno brevi, ovulis ignotis. Tab. 3, fig. 11–13.

BRAZIL: Bahia: over large areas fully exposed to the sun, in pure sand along the coast, 10 miles north of Bahia, May 29, 1939, *M. B. & R. Foster 46* (G, type).

Hohenbergia littoralis is unusual in its short compact inflorescence and evenly tapered floral bracts. This latter character makes it appear more like *H. attenuata* of Porto Rico than like any of the Brazilian species.

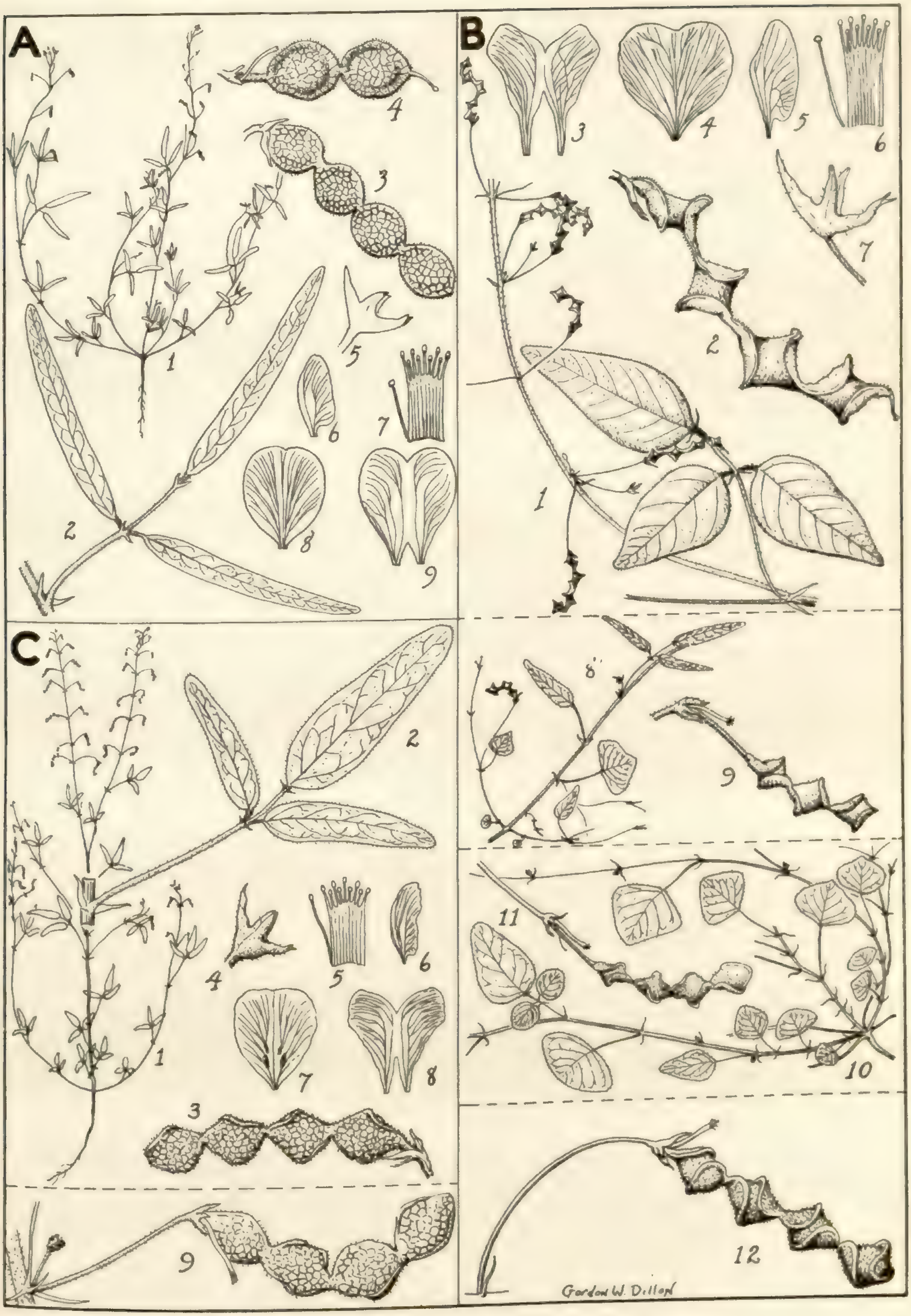
Hohenbergia minor, spec. nov., florifera infra 5 dm. alta; foliis 7 dm. longis, obscure punctulato-lepidotis, vaginis amplis, late ellipticis, ad 15 cm. longis, laminis ligulatis, late acutis apiculatisque, 20–45 mm. latis; scapo robusto; scapi internodiis ca. 45 mm. longis, quam bracteas ignotas verisimiliter brevioribus; inflorescentia parva sed ample 3–4-pinnatim paniculata; bracteis primariis delapsis ignotis; spicis sessilibus, crasse ellipsoideis, ad 17 mm. longis, paucifloris, nullo modo flocculosis; bracteis florigeris suborbicularibus, mucronatis, ad 6 mm. latis, valde concavis, leviter nervatis, punctulato-lepidotis, maturitate quam sepala multo brevioribus; sepalis asymmetricis, carinatis, mucronatis, 4 mm. longis, basi breviter connatis; petalis staminibusque ignotis; ovario compresso, tubo epigyno brevi, placentis apicalibus, ovulis caudatis. Tab. 3, fig. 17, 18.

BRAZIL: Bahia: terrestrial on river banks in full sun, Itapira, 60 kilometers from Auga Preta, June 6, 1939, *M. B. & R. Foster 69 A* (G, type); Agua Preta, alt. 240 m., June 3, 1939, *M. B. & R. Foster 69* (G).

Hohenbergia minor looks offhand like a miniature *H. Blanchetii* and runs down to the vicinity of that species in the Pflanzenreich key. Besides being much smaller, it differs from *H. Blanchetii* in its strongly mucronate sepals. Except for its lack of wooly indument and again its small size, it is much like *H. Ramageana.*

Explanation of Plate 3

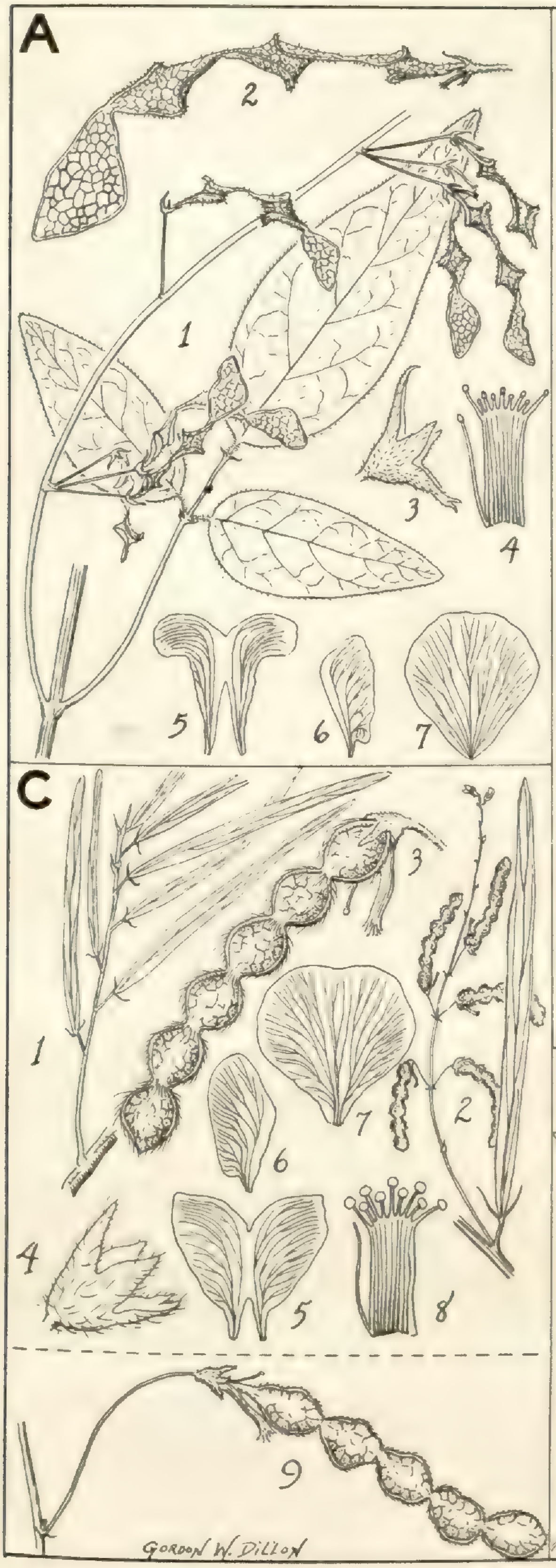
Fig. 1. Encholirium horridum L. B. Smith (*Foster 193*), scape and inflorescence × ca. 1/40.
2. Same, old flower × 1.
3. Same, seed × 5.
4. Cryptanthopsis navioides L. B. Smith (*Foster 90*), habit × ca. 1/10.
5. Same, base of leaf × 1.
6. Same, sepal × 1.
7. Hohenbergia disjuncta L. B. Smith (*Foster 64*), leaf × 1/10.
8. Same, scape and inflorescence × 1/10.
9. Same, floral bract × 1.
10. Same, sepal × 1.
11. Hohenbergia littoralis L. B. Smith (*Foster 46*) scape and inflorescence × 1/2.
12. Same, floral bract × 1.
13. Same, sepal × 1.
14. Hohenbergia brachycephala L. B. Smith (*Curran 121*), lateral branch of inflorescence × 1/2.
15. Same, floral bract × 1.
16. Same, sepal × 5.
17. Hohenbergia minor L. B. Smith (*Foster 69 A*), lateral branch of inflorescence × 1/2.
18. Same, sepal × 5.

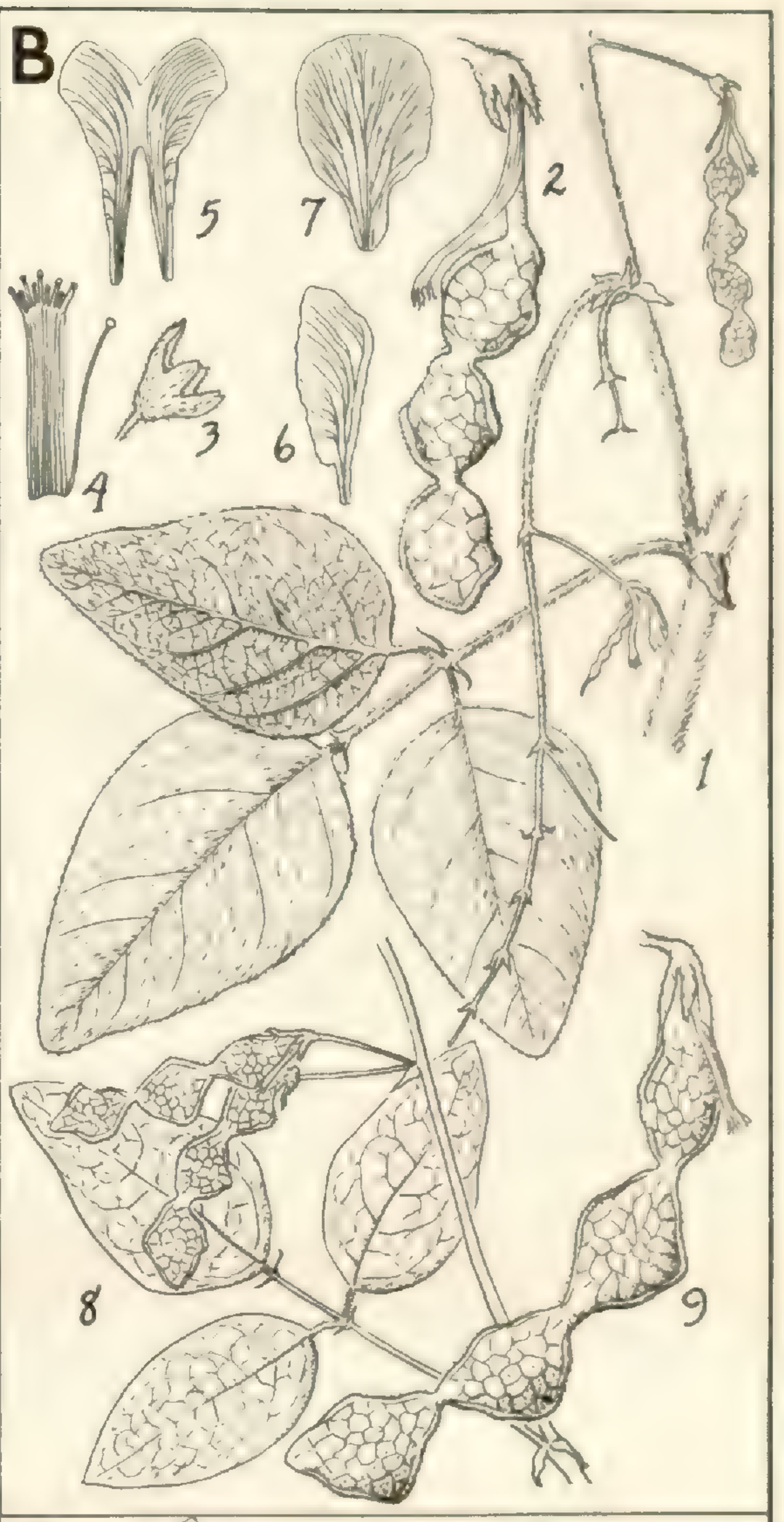


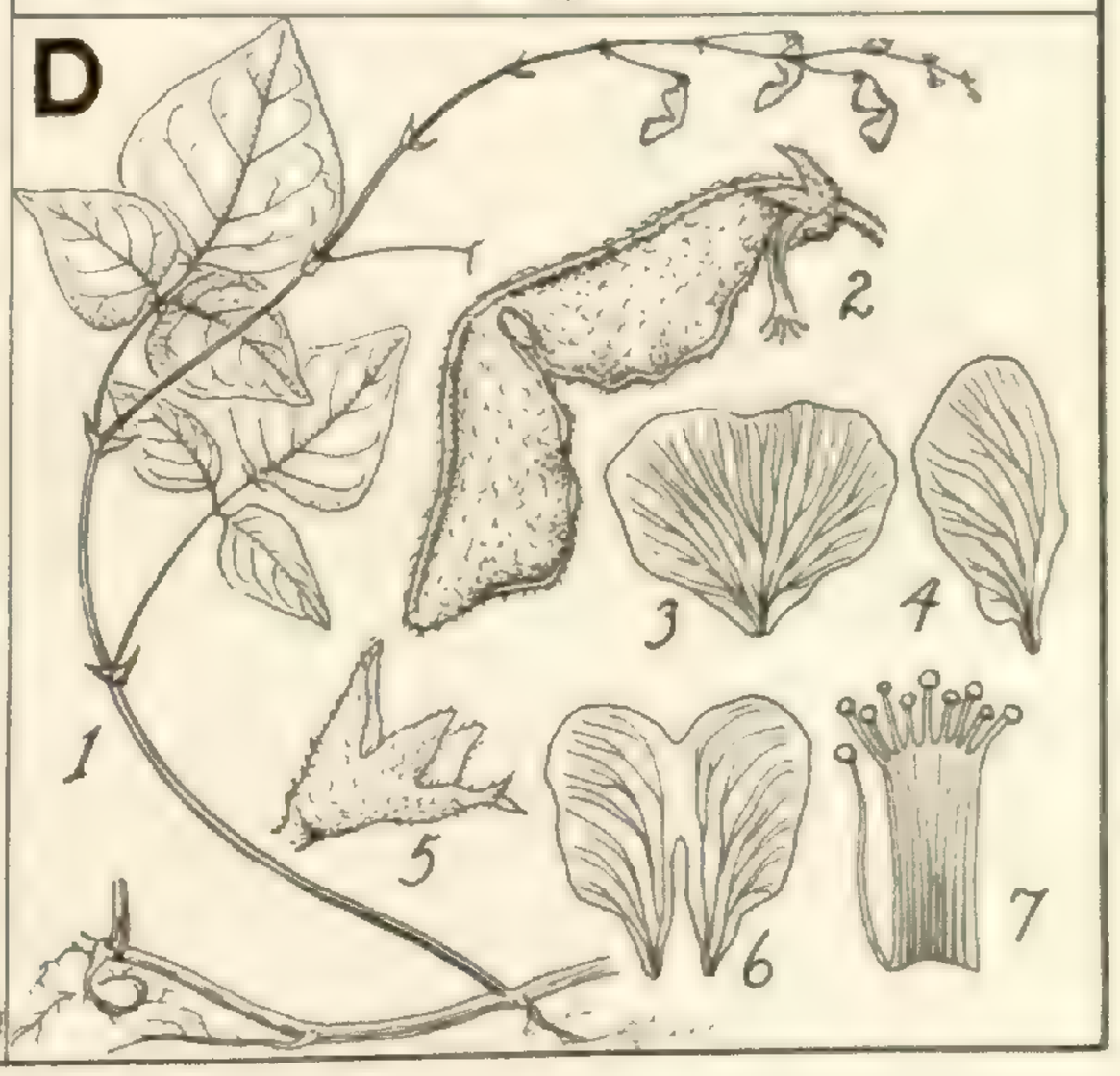
DESMODIUM ROSEI, n. sp.: FIGS. A1–9.

D. PROCUMBENS varieties: FIGS. B1–12. Var. TYPICUM: FIGS. 1–7. Var. EXIGUUM: FIGS. 8 and 9. Var. TRANSVERSUM: FIGS. 10 and 11. Var. LONGIPES: FIG. 12.

D. NEO-MEXICANUM: FIGS. C1–9.







DESMODIUM WIGGINSII: FIGS. A1–7.

D. TENUIPES varieties: FIGS. B1–9. Var. TYPICUM: FIGS. 1–7. Var. GLABRESCENS, n. var.: FIGS. 8 and 9.

D. ANGUSTIFOLIUM varieties: FIGS. C1–9. Var. TYPICUM: FIGS. 1–8. Var. GRAMINEUM: FIG. 9.

D. WYDLERIANUM: FIGS. D1–7.

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CXXX

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By Ruth P. Rossbach

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Pages 105–143 and Plates 590–592 . . . . . 2 April, 1940
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SPERGULARIA IN NORTH AND SOUTH AMERICA

RUTH P. ROSSBACH

(Plates 589–596)

INTRODUCTION

THE genus *Spergularia* (Pers.) J. & C. Presl[1] in North and South America includes forty species and varieties, five of which are introductions from other parts of the world. The genus reaches the height of its development in Chile where there are fourteen native species. Present collections of these indicate localized geographic distributions which, when studied in conjunction with the geology of the area and ecological conditions, should bring interesting results.

The genus was included in *Arenaria* by Linnaeus, Sp. Pl. (1753 & 1762) and Gen. Pl. ed. 5 (1754). Linnaeus also included one species of the genus under *Alsine*, Gen. Pl. ed. 5, 132 (1754). *Alsine* here included those species which are now known as *Stellaria media* and *Spergularia segetalis;* and *Stellaria media* is designated by the International Rules of Botanical Nomenclature as the type of *Alsine*. The first generic name used solely for the genus under discussion was *Tissa* Adans. Fam. ii. 507 (1763), which is immediately followed by another, *Buda* Adans. l. c., with no significant difference between the extremely cursory, tabular descriptions. In 1769, Mitchell, Princip. Bot. & Zool. App. Gen. Pl. 30, clearly separates the genus from *Arenaria* L.

[1] Fl. Čech. 94 (1819)

as *Corion*, giving a good description. *Corion*, in addition, has a pre-Linnaean basis in Mitchell, Act. Nat. Cur. viii. (1748). In 1805, Persoon, Synop. Pl. i. 504, used *Spergularia* as the name for a section or subgenus under *Arenaria*, and in 1819 J. & C. Presl, Fl. Čech. 94, raised this section to generic rank. *Spergularia* is a *nomen conservandum* according to the Internat. Rules Bot. Nom., revised by Internat. Bot. Congress of Cambridge, 1930, Appendix III, and therefore must be used instead of *Tissa* Adans. or *Buda* Adans, which for very good reasons have become *nomina rejicienda*. Of the many generic synonyms after *Spergularia* (Pers.) J. & C. Presl (1819), *Lepigonum* Wahlb. Fl. Gothob. 45 (1820), with its basis in section *Lepigonum* of *Arenaria* Fries, Fl. Hall. Add. 159 (1817), is the only one which has received extensive use.

No attempt will be made further to discuss the history of the various species of *Spergularia;* one glance at the extent of the synonymy in the following pages will show that a general statement would necessarily be too long and too involved to be of any value. It is sufficient to say that many combinations have been made under the various generic synonyms, many entities described upon superficial characters, such as habit and amount of pubescence, and species already recognized often badly confused. Few students of the genus have noted the variation within one entity, and many have entirely disregarded seeds. Since seeds offer the most important diagnostic character and the general habit is so similar, the confusion of many workers is easily explained.

It should be said, however, that the world monograph of *Lepigonum* by N. C. Kindberg (1863) deserves great praise. He clearly describes entities, giving exact measurements, and reveals careful examination of seeds. The illustrations are accurately and minutely done and, what is more remarkable for that early date, long synoptical treatments and careful citations of herbarium specimens are given. Much of the uncertainty evident in his treatment of American species is due to insufficient material.

In classifying Spergularias careful account, as already stated, should be taken of the seeds, size of mature capsule and its length in relation to sepals, type of inflorescence, size and quality of stipule, and type and degree of fasciculation of leaves. Many other characters serve as subordinate ones, such as number of stamens, length and degree of separation of styles, color of petals, and degree of pubescence.

The seeds of American Spergularias may vary in size from 0.35–1.4 mm. in length, *S. platensis* having the smallest, 0.35–0.4 mm., and *S. canadensis* the largest, 0.9–1.4 mm. The color of seeds varies from very light brown to red-brown, to dark brown, to black. Many species may have an iridescent or a silvery tinge in addition to the color. The surface of the seeds as seen by reflected light under the low power of a compound microscope may be smooth and dull in some species, as in *S. denticulata, S. marina, S. canadensis, S. media, S. macrotheca, S. ramosa, S. rupestris,* etc., or it may be very deeply sculptured in interwoven, vermiform pattern as in *S. rubra, S. atrosperma, S. fasciculata, S. aberrans, S. levis, S. grandis,* etc., or it may sometimes be roughened but in no regular pattern, as in *S. Bocconi, S. platensis, S. pycnantha,* etc. Again, the surface may be highly lustrous, as in *S. stenocarpa* and *S. cremnophila.* There should be an explanation of my use of the term vermiform. This is used to denote closely meandering lines upon the surface, as though a minute worm went back and forth in first this direction, then in that in search of food, leaving his trail behind. I have been unable to find any better term for this type of marking. Sometimes the superficial lines are in crude circles, giving an areolar appearance, and sometimes they are crowded together and deeply cut, making elongate ridges over the surface. Occasionally they are visible merely as very delicate traceries upon a smooth, dull surface, as in *S. villosa* or *S. macrotheca.* The type and presence of papillae are important, and these projections are, for convenience' sake, always considered as separate from the surface in the following treatment. The papillae may be nearly white and glandular to black and rigid and not glandular. They may be crowded upon the surface, giving an encrusted appearance, as in *S. andina, S. platensis* and *S. collina,* or they may be widely and regularly separated, as in *S. ramosa, S. rupestris,* or *S. marina.* Some species may always have papillae, as *S. rubra, S. andina, S. floribunda, S. collina, S. levis, S. pazensis* etc., while others never have papillae, as *S. media, S. macrotheca, S. arbuscula* and *S. denticulata.* There are many species, however, which may or may not have papillae, such as *S. marina, S. canadensis, S. platensis, S. ramosa, S. villosa, S. fasciculata, S. pycnantha* and *S. diandra.* Therefore, if papillae are present, it is important to examine them; if not, to note their absence; for these conditions in conjunction with other characteristics of the seed make it usually possible to identify the species by the seed alone. A characteristic of seeds long used and

often discounted by workers is the presence of a wing. The seeds of many species are never winged, in a few they are always winged, as far as known at present, but in a great many they may or may not be winged. However, if the wing is present, its margin, its color, and its width should be noted. These features may also, in addition to the surface, color, and size, lead one to positive identification.

In addition to seeds, the size of the mature capsules or, in a general way, the length of capsule compared to length of calyx may prove diagnostic. There are a few species in which the capsule is always shorter than the calyx and also a few in which it is always longer. However, there are a great many species in which the capsule may be slightly shorter than, equal to, or slightly longer than the calyx. The last cases show that the length of capsule, as compared to length of calyx, is at best a subordinate character.

In a few species the inflorescence may be short-noded and very crowded, as in *S. arbuscula, S. Cerviana, S. floribunda* and *S. pycnantha*. Other species may be much reduced in inflorescence, *i. e.* with only 1–3 flowers, as *S. andina, S. depauperata* and *S. Pissisi*. Many species may have lax, open, long inflorescences, as *S. grandis, S. pazensis, S. macrotheca, S. villosa* (sometimes), *S. stenocarpa* and *S. levis*. *S. congestifolia* is unique in having a minute-bracted inflorescence standing sharply differentiated, high above the crowded, leafy parts below. In many species, however, there is nothing striking about the inflorescence, which varies greatly in length of internodes and laxity.

In some species the stipules may be small and roughly deltoid, as in *S. canadensis, S. platensis, S. collina* and *S. ramosa* var. *diffusa*. Other species may have very large (as much as 8 mm. in length), lanceolate-acuminate stipules, as in *S. rupestris, S. levis, S. pazensis, S. ramosa, S. macrotheca, S. aberrans, S. pycnantha* and *S. villosa* (sometimes), although even these may sometimes have smaller stipules of around 5 mm. or less in length. In *S. congestifolia, S. arbuscula*, and usually in *S. fasciculata*, the stipules are strongly lacerate. All the remaining species have medium-sized, non-distinctive stipules which show a great variation in size. Indeed, every species is variable as to stipules to such an extent that their characters must always be considered subordinate.

The leaves of all Spergularias are linear and usually mucronate. In some species they are generally shorter than in others, though

there is usually great variation in length. Some species always have nearly filiform, relatively non-fleshy leaves, as in *S. rubra* and *S. congestifolia;* others have them extremely fleshy, as in *S. arbuscula,* and usually in *S. macrotheca,* while others may have less fleshy leaves, as in *S. fasciculata.* More important than fleshiness is degree of fasciculation, which reaches its height in *S. rubra, S. congestifolia, S. arbuscula, S. fasciculata, S. villosa* and *S. confertiflora.* Other species never have fascicled leaves, such as *S. canadensis, S. platensis* and *S. collina.* There are a great many species, however, in which the leaves are usually not fascicled but are sometimes slightly so.

It is evident from the above discussion that seed-differences are the most useful of diagnostic characters and that combinations of all other characteristics should supplement the study of seeds. However, it must be said that after long study of the many American species, one can become so well acquainted with them that new collections can quickly be sorted out almost without error without microscopic examination. This is due, I suppose, to the combinations of characters peculiar to each species.

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I am indebted to Prof. H. Humbert of the Muséum National d' Histoire Naturelle, Paris. To Mr. J. Ramsbottom, Keeper of Botany, British Museum, I am grateful for photographs of pertinent plants from the Clayton and Clifford Herbaria. I am indebted to Dr. S. J. v. Ooststroom, Assistant-in-chief, Rijksherbarium, Leiden, for data and a photograph of another type. Photographs of all types studied are deposited in the Gray Herbarium.

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The following symbols have been employed in the citation of specimens from the above herbaria: United States National Herbarium (U. S.); Royal Botanic Gardens, Kew (K.); New York Botanical Garden (N. Y.); California Academy of Sciences (Cal. Acad.); Botanical Museum at Berlin-Dahlem (B.); Museo de La Plata (La

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Synopsis of Spergularia in North America[1]

a. Plants perennial.....*b.*

b. Seeds 0.7–0.9 mm. long, never papillose: styles 0.6–3 mm. long: sepals 5–10 mm. long: capsule robust.

Styles 0.6–1.2 mm. long: petals pink or rosy.....1. *S. macrotheca.*

Styles 1.2–3 mm. long: petals white.

Styles 1.2–1.8 mm. long: capsule as much as 0.5–3 mm. longer than the calyx: seeds dark reddish-brown, always smooth.....2. *S. macrotheca*, var. *leucantha.*

Styles 2–3 mm. long: capsule equal to or as much as 1 mm. shorter than the calyx: seeds usually nearly black and ordinarily silvery tinged, commonly deeply sculptured in interwoven, vermiform, areolar pattern.....3. *S. macrotheca*, var. *longistyla.*

b. Seeds 0.4–0.6 (rarely 0.65) mm. long, papillose or not: styles 0.2–0.6 mm. long: sepals 2–5 (rarely 5.2) mm. long: capsule more slender.....*c.*

c. Leaves not fascicled (rarely with one small, leafy branch in the axil), glabrous: root fleshy (fibrous, farinaceous), often 1 cm. thick: styles 0.2–0.4 mm. long: petals 1.2–2.4 mm. long: sepals glabrous or with only sparse, short, glandular pubescence: seeds brown, rounded in outline, sculptured in interwoven vermiform pattern, densely covered with large, glandular papillae which are often cup-shaped, never winged.....4. *S. mexicana.*

c. Leaves densely fascicled, glandular-pubescent: root heavy, ligneous, not farinaceous: styles 0.4–0.6 mm. long: petals 2.6–5 mm. long: sepals densely glandular-pubsecent: seeds very dark brown, nearly black, pyriform, not sculptured, covered with widely spaced, hard, black, non-glandular papillae or not papillose, surrounded by a white, scarious, erose wing or not winged.....29. *S. villosa.*

a. Plants annuals or short-lived perennials.....*d.*

d. Seeds black.

Seeds 0.6–0.8 mm. long, rounded in outline, often with an iridescent tinge, sculptured in interwoven, areolar vermiform pattern, often deeply so: capsule as much as 0.6–1.4 mm. longer than the calyx: stipules 1.8–2.8 mm. long.....5. *S. atrosperma.*

[1] Measurements should be made to 0.1 mm. under a hand-lens and seeds should be examined under the low power of a compound microscope.

Seeds 0.4–0.5 mm. long, pyriform, often with a silvery but not iridescent tinge, closely sculptured in interwoven, vermiform, but not areolar pattern: capsule equal to or as much as 0.5 mm. longer than the calyx: stipules 1–2 mm. long.....6. *S. diandra*

. Seeds brown.....*e.*

e. Stamens 6–10.....*f.*

f. Seeds smooth, not papillose, usually surrounded by a wing, occasionally not winged, 0.6–1.1 mm., usually 0.8–1 mm. long: capsule large, usually 5.5–7 mm. long: large, robust plants, usually with fleshy leaves.....11. *S. media.*

f. Seeds roughened or sculptured, always papillose, never winged, 0.4–0.6 mm. long: capsule smaller, 2.8–5.4 mm. long: plants more delicate, usually with less fleshy leaves.

Leaves densely fascicled, filiform, scarcely fleshy: seeds dark brown, deeply sculptured in closely interwoven, vermiform pattern: stipules triangular-acuminate, conspicuous because of the large number of shining ones at a node, usually 3.5–5 mm. long.....7. *S. rubra.*

Leaves not fascicled or only slightly so, more fleshy: seeds very light brown, surface reticulated or roughened in no regular pattern: stipules deltoid, dull white and scarcely acuminate, 2–4 mm. long.....8. *S. Bocconi.*

e. Stamens 2–5.....*g.*

g. Seeds large, 0.9–1.4 (very rarely 0.8) mm. long, smooth or with irregular, reticulate thickenings, partially or entirely surrounded by a white, scarious, erose wing or not winged, sometimes with long, delicate, glandular pubescence, especially on the swollen rim at the summit.

Prostrate or decumbent, always entirely glabrous except for the rarely sparsely glandular-pubescent pedicels: sepals always glabrous, blunt-tipped, 2.2–3.2 mm. long: mature capsule once-and-a-half to twice the length of the calyx....9. *S. canadensis.*

Erect or nearly so, glabrous or glandular-pubescent throughout: sepals not blunt-tipped, 3–4.6 mm. long: mature capsule less than one-and-a-half times the length of the calyx..10. *S. canadensis*, var. *occidentalis.*

g. Seeds 0.35–0.8 (very rarely 0.9) mm. long.....*h.*

h. Seeds 0.35–0.4 mm. long: infloresence a much compounded cyme, glabrous throughout: sepals 0.8–1.6 mm. long: mature capsule 1.4–2.6 mm. long.....33. *S. platensis.*

h. Seeds 0.5–0.8 (rarely 0.9) mm. long, glandular-papillose or not: inflorescence a lax, simple or only 1–2-times compounded cyme, sometimes glabrous but usually glandular-pubescent: sepals 1.6–5 mm. long: mature capsule 3–6.4 mm. long.

Seeds silver-tinged, always roughened and often sculptured in irregular, vermiform pattern with irregular, short ridges between the sculptures: stipules shorter than broad, 1.4–2.4 mm. long: styles 0.3–0.4 mm. long.....14. *S. echinosperma.*

Seeds dull, smooth or occasionally only slightly roughened by raised thickened areas: stipules as long as or longer than broad, 2–4 mm., usually 2.5–3 mm. long: styles 0.4–0.6 mm. long.
Inflorescence a lax cyme, not crowded: sepals 2.4–5 mm. long: mature capsule 3.6–6.4 mm. long.....12. *S. marina.*
Inflorescence crowded, with many flowers: stems highly branched: sepals usually shorter, 1.6–3.8 mm. long: mature capsule usually shorter, 3–4.4 mm. long.....13. *S. marina*, var. *tenuis.*

Synopsis of Spergularia in South America[1]

a. Stipules deeply lacerate, *i. e.* for one-third their length or more.....*b.*
b. Inflorescence with much longer internodes than those of the stem, the inflorescence thus standing sharply differentiated high above the leafy lower parts: leaves short, filiform, falcate, densely fascicled: stipules lacerate for nearly two-thirds their length, giving the plant a silky appearance: fruiting pedicels long, the lowest 10–23 mm.: seeds unknown.....15. *S. congestifolia*
b. Inflorescence with internodes not longer than those of stem, not sharply differentiated from the leafy parts below: leaves not falcate, filiform to very fleshy: stipules lacerate for one-half their length or less: fruiting pedicels usually shorter, often very short: seeds dark brown or black.
Small shrub: inflorescence a compact cyme with crowded internodes: sepals glabrous or slightly glandular-pubescent at the base, 2.4–5 mm. long: petals 1.8–4 mm. long: styles 0.8–1.2 mm. long, separated to the base: mature capsule 1.6–3.6 mm. long: fruiting pedicels very short, the lowest 1–3 mm. long: seeds 0.6–0.8 mm. long, shining but never silvery, never winged..16. *S. arbuscula.*
Perennial but not a shrub, *i. e.* herbaceous above the caudex: inflorescence a short, open cyme: sepals always glandular-pubescent, 5–10 mm. long: petals 4–10 mm. long: styles 1.5–2.5 mm. long, separating only partially, at the most 0.6 mm. from the apex: mature capsule 5–7 mm. long: fruiting pedicels 6–17 mm. long: seeds 0.8–1 mm. long, often with a silvery tinge, surrounded by a narrow, scarious wing or not winged.....17. *S. fasciculata.*

a. Stipules very shortly or not at all lacerate at the apex.....*c.*
c. Inflorescence with only 1–3 (rarely 4) flowers: plants with short internodes, usually forming low, thick mats.....*d.*
d. Sepals hooded at the apex: mature capsule 3–4 mm. long, exceeded by the calyx by as much as 0.5–1.2 mm.: fruiting pedicels very short, 0.5–2.5 mm. long: seeds brown, deeply sculptured and covered with large, glandular papillae which give them an encrusted appearance, 0.6–0.8 mm. long, not winged.....18. *S. andina.*
d. Sepals blunt, not hooded, usually very fleshy: mature capsule 4.8–5.5 mm. long, equal to or but slightly exceeding the calyx, by as much as 0.5 mm.: fruiting

[1] Measurements should be made to 0.1 mm. with a hand-lens and seeds should be examined under the low power of a compound microscope.

pedicels 3–15 mm. long: seeds only delicately sculptured, 0.8–1 mm. long, always surrounded by a scarious wing.

Seeds light brown, surrounded by a broad wing so deeply lacerate as to form strap-like appendages 0.3–0.6 mm. long, covered with regularly spaced, glandular hairs branched at the tips: internodes of stem below the inflorescence without corky appearance: leaves filiform, not fleshy, usually 7–13 mm. long, 0.5 mm. broad: fruiting pedicels 6–15 mm. long.....19. *S. depauperata.*

Seeds dark brown, with a narrow, entire-margined wing 0.1 mm. wide, not papillose: internodes of stem below the inflorescence soft, with corky appearance: leaves linear, fleshy, 2–7 mm. long, 0.8–1 mm. broad: fruiting pedicels 3–5 mm. long.....20. *S. Pissisi.*

c. Inflorescence more than 3–4-flowered: plants lax and spreading, not forming thick mats.....*e.*

e. Seeds with broad, scarious wings 0.3–0.7 mm. wide and with nearly entire margins.....*f.*

f. Seeds light brown, not sculptured, smooth or covered with widely and regularly spaced brown papillae.

Central root not fleshy and starchy: styles 1–1.4 mm. long: leaves not spreading: stipules at least twice as long as broad, usually 3–5 mm. long: mature capsule equal to or slightly exceeding the calyx.....35. *S. ramosa.*

Central root fleshy and starchy, with a smooth, corky bark: styles 0.7–0.8 mm. long: leaves often spreading, giving a pseudoverticillate appearance: stipules usually shorter, almost deltoid, commonly 1.2–3 mm. long: mature capsule at least one-third longer than the calyx..36. *S. ramosa*, var. *diffusa.*

f. Seeds dark, reddish brown or black, sculptured or not, papillose or not.

Seeds sculptured and with or without dark papillae.

Capsule 4–5-valved: styles 4–5: stems robust, 2–2.5 mm. in diameter.....38. *S. grandis.*

Capsule 3-valved: styles 3: stems 0.8–1.5 mm. in diameter.....39. *S. pazensis.*

Seeds not sculptured but smooth or with low, elongate mounds, never papillose.....11. *S. media.*

e. Seeds with wings less than 0.3 mm. wide or if so broad with erose margins, or not winged.....*g.*

g. Seeds brown, highly lustrous, smooth or only slightly sculptured.

Mature capsule slender, 3.2–4.8 mm. long: stamens 5: seeds 0.4–0.7 mm. long, not winged but sometimes with an extremely narrow, brown rim.23. *S. stenocarpa.*

Mature capsule robust, 5–6.6 mm. long: stamens 8–10: seeds 0.7–1.2 mm. long, surrounded by a hard, narrow, brown rim.....21. *S. cremnophila.*

g. Seeds not lustrous, smooth or deeply sculptured.....*h.*

h. Sepals mucronate: plant annual: seeds brown, smooth, dull, 0.5–0.6 mm. long.....24. *S. denticulata.*

h. Sepals not mucronate.....*i.*

i. Seeds black or dark brown, deeply sculptured in interwoven, vermiform pattern, 0.8–1 mm. long.....*j.*

j. Stamens 5: seeds dark, sepia-brown, surrounded by a narrow, brown, sculptured wing....22. *S. aberrans.*
j. Stamens 7–10.....*k.*
k. Inflorescence a crowded, compound, many-flowered cyme, glabrous or only very sparsely pubescent: sepals glabrous, 2.6–4.5 mm. long: seeds covered with large, glandular papillae.....25. *S. Cerviana.*
k. Inflorescence an open, often lax cyme, densely glandular-pubescent: sepals densely glandular-pubescent, 5–10 mm. long. Inflorescence a short, open cyme, not lax: styles united for more than one-half their length: leaves densely fascicled, usually filiform.....17. *S. fasciculata.*
Inflorescence a lax cyme: styles divided to the base or united only rarely for as much as one-half their length: leaves usually not so densely fascicled.
Seeds brown, dull, with only occasional, small papillae: mature capsule 5–6.6 mm. long, equal to or as much as 2.4 mm. shorter than the calyx: leaves fleshy, 1–3 mm. wide.....21. *S. cremnophila.*
Seeds very dark brown or black, glistening, nearly always covered with many, large, dark papillae: mature capsule usually much larger, 6.2–8.4 mm. long, equal to or up to 2 mm. longer than the calyx: leaves only 0.4–1 mm. wide.....39. *S. pazensis.*
i. Seeds light brown, or if dark brown or black less than 0.8 mm. long, or if 0.8–1 mm. long not sculptured and either light or dark brown.....*l.*
l. Sepals very short, 0.8–1.6 mm. long: plant glabrous throughout, very slender, with a much compounded cyme: seeds 0.35–0.4 mm. long, sculptured and usually papillose.33. *S. platensis.*
l. Sepals longer, 2.2 mm. or more long.....*m.*
m. Capsule spherical: seeds black, densely covered with papillae, 0.4–0.7 mm. long, not winged.....26. *S. floribunda.*
m. Capsule not spherical....*n.*
n. Seeds winged.....*o.*
o. Seeds deeply sculptured in interwoven, vermiform pattern.
Plant glabrous throughout: internodes 28–50 mm. long: leaves long, 22–80 mm.: capsule usually 6–8 mm. long, as much as 1.6–3.4 mm. longer than the calyx: fruiting pedicels glabrous, the lowest 7–20 mm. long: seeds deep reddish-brown, glandular-papillose, surrounded by a scarious, white, strongly erose wing.....37. *S. levis.*
Plant glandular-pubescent at least in the inflorescence: internodes 6–20 mm. long: leaves 15–20 mm. long:

capsule 5–5.2 mm. long, equaling or up to 1 mm. longer than the calyx: fruiting pedicels glandular-pubescent, the lowest 5–7 mm. long: mature seeds unknown ..... 32. *S. colombiana.*

o. Seeds not sculptured.

Stamens 2–5 ..... 12. *S. marina.*

Stamens 7–10.

Seeds 0.4–0.6 (rarely 0.65) mm. long, pyriform, very dark brown or nearly black..... 29. *S. villosa.*

Seeds 0.7–1.1 mm. (very rarely 0.6 mm.) long, rounded in outline, light brown to dark brown.

Seeds light brown, covered with brown papillae, 0.7–0.8 mm. long: mature capsule equal to or as much as 0.8 mm. shorter than the calyx: sepals densely glandular-pubescent: styles 1–1.2 mm. long..... 40. *S. rupestris.*

Seeds dark brown, not papillose, 0.7–1.1 (rarely 0.6) mm. long: mature capsule usually 1–2.5 mm. longer than the calyx, rarely equaling it: sepals glabrous or only sparsely glandular-pubescent: styles 0.5–1 mm. long..... 11. *S. media.*

n. Seeds not winged.... *p.*

p. Stamens 6–10..... *q.*

q. Annual or sometimes a short-lived perennial..... *r.*

r. Seeds not sculptured but smooth or with low, elongate mounds, 0.7–1.1 (rarely 0.6) mm. long..... 11. *S. media.*

r. Seeds sculptured or irregularly roughened and papillose, 0.4–0.8 mm. long.

Seeds black, covered with long, large, black, glandular papillae: inflorescence widely angled: styles 0.8–1 mm. long..... 30. *S. collina.*

Seeds brown, with minute, small, brown papillae: inflorescence crowded or lax but not widely angled: styles 0.4–0.8 mm. long.

Leaves densely fascicled: stipules lanceolate-acuminate, shining, conspicuous because of their great number at an internode: styles 0.6–0.8 mm. long: seeds dark brown, not silvery, deeply sculptured in closely interwoven, vermiform pattern.... 7. *S. rubra.*

Leaves not fascicled or with only 1–2 minute leaves at the

axil: stipules deltoid or nearly so, dull, inconspicuous: styles 0.4–0.6 mm. long: seeds light brown, often silver-tinged, surface reticulated and roughened but in no regular pattern.....8. *S. Bocconi.*

q. Perennials.....*s.*

s. Sepals glabrous but sometimes glandular-punctate.

Seeds light brown, not papillose, but often with minute, elongate ridges, 0.5–0.6 mm. long: sepals recurved but incurved at the apex, often hooded, usually minutely glandular-punctate, especially on the upper parts: inflorescence a lax cyme....31. *S. Spruceana.*

Seeds dark brown, covered with glandular papillae, 0.6–0.8 mm. long: sepals not recurved, nor hooded, nor glandular-punctate: inflorescence a compound cyme, usually crowded because of many capsules and short internodes.....25. *S. Cerviana.*

s. Sepals glandular-pubescent.

Capsule longer than the calyx: seeds dark brown, nearly black, pyriform, not sculptured but with regularly spaced, black papillae or not papillose, and with very delicate, vermiform traceries in areolar pattern, 0.4–0.6 (rarely 0.65) mm. long. 29. *S. villosa.*

Capsule equal to or as much as 0.8 mm. shorter than the calyx: seeds brown, rounded in outline, sculptured in interwoven, vermiform pattern, with large, elongate, slightly curved papillae (some seeds having in addition some round papillae), 0.6–0.7 mm. long.....28 *S. confertiflora.*

p. Stamens 2–5.

Annual: the non-sculptured seeds covered with glandular papillae or not papillose, 0.6–0.8 mm. long. 12. *S. marina.*

Perennial: the sculptured seeds papillose or not, 0.3–0.5 mm. long.

Whole plant glabrous: sepals 2.2–2.8 mm. long: capsule as much as 1–1.2 mm. longer than the calyx: stipules deltoid, 1.2–1.6 mm. long: cyme simple, not crowded. 34. *S. platensis*, var. *Balansae.*

Whole plant densely glandular-pubescent: sepals 3.6–4.6 mm. long: capsule equal to or as much

as 0.8 mm. shorter than the calyx: stipules lanceolate-acuminate, 5–7 mm. long: cyme compound and usually crowded by many capsules and short upper internodes. 27. *S. pycnantha.*

1. S. MACROTHECA (Hornem.) Heynh. (PLATE 589, FIGS. 1a–1c and MAP 1). Perennial: *caudex* branched, becoming woody with age, bearing from 1– ∞ prostrate or semi-erect stems 3–45 cm. long; *internodes of stem below the inflorescence* glabrous or glandular-pubescent, 2–50 mm. long, 0.8–3 mm. in diameter: *leaves* fascicled or not, mucronate, fleshy, 0.6–3 mm. broad, 7–50 mm. long, glabrous to densely glandular-pubescent; *stipules conspicuous, triangular-acuminate,* 4–11 mm., usually 6–9 mm. long: *inflorescence* always glandular-pubescent throughout, lax with long internodes or crowded with short internodes but with the internodes becoming shorter toward the apex, the *lowest internodes* 3–35 mm. long, 0.8–1.4 mm. broad: *sepals* broadly lanceolate, *often attenuate,* glandular-pubescent, 5–10 mm., usually 6–9 mm. long; *petals* ovate, *rosy to light pink* and perhaps occasionally white,[1] 3.5–8, usually 4–6 mm. long, as much as 0.4–4 mm. shorter than calyx; *stamens* 10; *styles* 3, 0.6–1.2 mm. long, separated to base: *mature capsules* 5.5–10, usually 6–8 mm. long, 2 mm. shorter to 2 mm. longer than calyx: *fruiting pedicels* reflexed or not, the lowest 5–35 mm. long, 0.2–1, usually 0.6–0.8 mm. thick: *seeds dark, reddish-brown, dull, nearly smooth* or slightly hubbled with low, rounded mounds, usually not sculptured or with only scarcely discernible vermiform, areolar traceries or occasionally very obvious channels upon the surface, 0.6–1 mm., usually 0.7–0.9 mm. long, *usually surrounded by a narrow, scarious, white or brownish, entire wing* 0.2 mm. or less wide, *or by a still narrower, opaque, brown rim,* occasionally not winged.—Heynh. Nom. ii. 689 (1846); Robins. in Proc. Am. Acad. xxix. 312 (1894); Robins. in Gray, Synop. Fl. N. Am. i. 252 (1897); Jepson, Fl. Calif. 493 (1914); Jepson, Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935); Macbride, Field Mus. Nat. Hist. Pub. Bot. xiii.—Fl. Peru, pt. ii. no. 2. 631 (1937), perhaps as to description but the species not known from Chile and Peru. *Arenaria macrotheca* Hornem. ex Cham. & Schlecht. in Linnaea, i. 53 (1826). *Lepigonum macrothecum* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), *nomen nudum;* Kindb. Synop. Lepig. 14 (1856). *Lepigonum macrothecum* (Hornem.) Kindb. Mon. Lepig. 16, t. i. fig. i. (1861); Wats. Bibl. Index (Smithson. Misc. Coll. 258), 103 (1878); Brewer & Watson in Geol. Survey of California, Botany, i. 71 (1876). *Spergularia rubra* sensu Torrey, Pacific R. R. Report, Botany, iv. 70 (1857), in part (Corte Madera coll. includes 2 plants, *S. macrotheca* and *S. media;* Martinez collection not found), non *Arenaria rubra* L. (1753); sensu

[1] I have never seen any absolutely white in the field but some labels state distinctly that the flowers are white. It is possible that the very light pink tinge was not noticed.

Torrey, Wilkes Explor. Exped. xvii., Botany, 247 (1874), in part at least (including the Lower Sacramento coll. the Puget Sound coll. not found), non *Arenaria rubra* L. (1753). *Tissa pallida* Greene ex Britton in Bull. Torr. Bot. Club, xvi. 126 (1889) (Monterey, *Meehan* coll. not seen); Greene, Man. Bot. San Francisc. Bay, 36 (1894). *Tissa macrotheca* (Hornem.) Britt. in Bull. Torr. Bot. Club, xvi. 129 (May 8, 1889); Brandeg. in Proc. Calif. Acad., Ser. 2, ii. 131 (Nov. 12, 1889), probably, though Socorro, Lower Calif. coll. not seen; Greene, Man. Bot. San Francisc. Bay, 35 (1894); Jepson, Fl. W. Mid. Calif. 169 (1901); Howell, Fl. Northwest Coast, 88 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.), 263 (1906); Piper and Beattie, Fl. Northwest Coast, 145 (1915). *Tissa macrotheca* var. *scariosa* Britt. in Bull. Torr. Bot. Club, xvi. 129 (1889); Jepson, Fl. W. Mid. Calif. 170 (1901). *Buda macrotheca* (Hornem.) Kuntze, Rev. Gen. 50 (1891). *Tissa Talinum* Greene in Erythea, i. 106 (1893). *Tissa valida* Greene in Erythea, i. 107 (1893). *Spergularia macrotheca* var. *scariosa* (Britt.) Robins. in Proc. Am. Acad. xxix. 313 (1894) and Synop. Fl. i. 253 (1897); Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923). *Spergularia macrotheca* var. *Talinum* (Greene) Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935). *Alsine valida* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *Alsine macrotheca* (Hornem). House, l. c. *Alsine Greenei* House, l. c., renaming of *Tissa pallida* Greene.—NORTH AMERICA: along the Pacific Coast from northern Baja California to Vancouver Island, British Columbia. BAJA CALIFORNIA: San Quentin, *E. Palmer* 732, February, 1889 (U. S., G.); 23 miles south of Hamilton's Ranch, Santa Maria Plains, *Wiggins* 4537, March 23, 1930 (D. S.); Ensenada, *M. E. Jones*, April 11, 1882 (Pom.). Guadalupe Island, *E. Palmer* 864, March 29, 1889 (U. S., G., U. C., very thick, short, fleshy leaves); *E. Palmer* 864a, March 29, 1889 (U. S., Notre Dame, U. C., type collection of *Tissa Talinum* Greene, with short, glabrous, linear leaves); *Rose* 16027, March 2, 1911 (U. S., G., with glabrous linear leaves). CALIFORNIA: San Diego Co.: Oceanside, *S. B. Parish* 4451, June 11–16, 1897 (G., U. S.); sand dune strand, La Jolla, *F. E. & E. S. Clements*, March 14, 1914 (G.); sandy ocean beach, La Jolla, *L. F. Henderson* 13404, Jan. 31, 1931 (Ore.). Riverside Co.: alkaline marsh, Wildomar, *I. M. Johnston* 1872, April 27, 1918 (U. S., Pom.);[1] between Murietta and Temecula, *Munz* 2136, April 27, 1918 (Pom.).[1] Orange Co.: Newport Bay, *Lawrence M. Booth* 1062, May 19, 1932 (U. C., Pom.). Los Angeles Co.: moist ground of drying winter pool, mesa at north end of Baldwin Hills, Culver City, *Ewan* 7438, April 30, 1932 (U. C.); Ballona Harbor, *Abrams* 1223, April 1, 1901 (D. S., Pom.); east side of San Clemente Island, overhanging cliffs near the beach, *Nell Murbarger* 65, March, 1936 (U. C., with long lax stems and open inflorescence characteristic of *S. macrotheca*); sand dune, northwest coast, San Clemente Island, *Munz* 6608, April

[1] Even though on the coast, this collection has pink flowers and short styles.

8, 1923 (Pom., U. C., G., large fleshy plants with many-flowered, open inflorescence, seeds 0.6–0.7 mm. long); San Clemente Island, *M. E. Jones*, September 9, 1926 (Pom., inflorescence dense, erect habit approaching *Palmer* 864 from Guadalupe Island, seeds 0.6–0.9 mm. long); San Clemente Island, *Brandegee*, August 25, 1894 (U. C., 2 sheets, heavy, fleshy plants, one with inflorescence sharply differentiated and the other not, seeds 0.8 mm. long, habit approaching Guadalupe Island plants, such as *Palmer* 864a and 864); low ground near beach, Little Harbor, Santa Catalina Island, *M. B. Dunkle* 1910, April 29, 1928 (Pom.); seaside, Avalon, Santa Catalina Island, *Blanche Trask*, May, 1896 (U. S.); back beach flat, Emerald Bay, Santa Catalina Island, *M. B. Dunkle* 1815, April 9, 1928 (Pom.). Ventura Co.: frequent along seashore, San Nicolas Island, *Blanche Trask* 25, April, 1901 (G.); Santa Barbara Island, *Abrams & Wiggins* 312, July 3, 1931 (U. C., Cal. Acad., D. S.); on dry clay flat, Anacapa Island, *John T. Howell* 3803, May 19, 1928 (Cal. Acad.); along beach, Ventura, *Alice Eastwood* 5026, April 17, 1916 (Cal. Acad.). Santa Barbara Co.: sand dunes adjacent to Santa Barbara, *Eastwood*, May 30, 1909 (Cal. Acad.); deep sand of ravines between high dunes, Surf, *Grant, Ballon, & Ewan* 7921, May 30, 1933 (Pom.); Santa Cruz Island, *Greene*, July and August, 1886 (U. C., D. S.), type coll. of *Tissa valida* Greene; heavy soil in grassy places near ranch, Santa Rosa Island, *Munz & Crow* 11747, April 9, 1930 (Pom.); San Miguel Island, *Ralph Hoffmann*, June 11, 1930 (Cal. Acad.). San Luis Obispo Co.: roadside, Cayucos, *I. J. Condit*, June 14, 1911 (U. C.); along Morro Bay, *Eastwood* 18874, April 19, 1935 (Cal. Acad.); Roosevelt Highway n. of San Simeon, *Ynez Whilton Winblod*, June 17, 1937 (Cal. Acad.). Monterey Co.: Point Sur, *R. S. Ferris* 3701, April 22, 1923 (D. S.); Point Lobos, *Greene*, July 1, 1891 (U. S., W., D. S.); on maritime rocks, Cypress Point, Monterey, *A. Gray*, February–May, 1885 (G.,[1] low plants with short internodes); Pacific Grove, *Tidestrom*, June 6, 1893 (G., U. C., D. S., Pom.); Pacific Grove, *Elmer* 4387, June, 1903 (U. S., U. C., Pom., D. S., Ore.); Pacific Grove, *Gwendolyn Newell*, July 8, 1914 (G., Cal. Acad., seeds small, 0.6–0.7 mm. long, plants very lax and with long internodes); coast of Monterey, *J. D. Hooker and A. Gray*, Hayden's Survey of U. S. Territories, 1877 (G.,[1] lower internodes short but inflorescence open and high above). Santa Cruz Co.: ocean bluffs, Santa Cruz, *Lewis S. Rose* 35221, June 16, 1935 (Cal. Acad.). Santa Clara Co.: San Jose, *Mrs. E. A. Bush*, 1880 (U. S.). San Mateo Co.: in muddy clay at bottom of a small gully in high sea cliffs, 3 miles south of Half Moon Bay, *G. B. & R. P. Rossbach* 608, November 25, 1937 (G., D. S.,[2] lax, long-

[1] Cited under *Tissa macrotheca* var. *scariosa* by Britt. in Bull. Torr. Bot. Club, xvi. 129 (1889).

[2] These three collections were made at the same time within a few feet of each other and show characteristic plants of *S. macrotheca* and of var. *scariosa* (Britt.) Robins. with transition stages. It may be seen that sheltered plants grow lax and longer-leaved, while plants in exposed places become compressed mats with shorter

stemmed plants); forming hanging mats and cushions in soft sandy soil, face of sea cliffs, same locality, *G. B. & R. P. Rossbach* 609, November 25, 1937 (G., D. S.);[1] on top of sea cliffs of crumbling rock and sandy soil, same locality, *G. B. & R. P. Rossbach* 610, November 25, 1937 (G., D. S.,[1] part of the plants with *very* short internodes, making plants small and congested); Belmont, *Burtt Davy* 809, April 17, 1893 (U. C.); mats on cliffs along coast, Montara Point, *Copeland* 3317, June 5, 1903 (U. S., G., Pom., U. C., determined as *Tissa pallida* by E. L. Greene). San Francisco Co.: bluffs near the sea, back of Lake Merced, *Greene*, June 9, 1887 (U. C., D. S., type collection of *Tissa pallida* Greene); saline soils, South San Francisco, *Stewart H. Burnham* 931, April 21, 1895 (Pom., both a long- and a short-internoded plant, the latter similar in habit to Guadalupe and San Clemente plants); Presidio, San Francisco, *Heller* 5700, June 12, 1902 (G., Pom., D. S., U. S.); near San Francisco, *J. Torrey* 41, 1865 (G., type collection of *Tissa macrotheca* var. *scariosa* Britt., with very short internodes); San Francisco, *K. Brandegee* June, 1890 (G., both short-internoded compressed and long-internoded lax plants in same collection); Farallone Island, *L. M. Loomis*, July, 1896 (U. C.). Contra Costa Co.: Point Richmond, *H. M. Hall* 1664, March 16, 1921 (U. C.). Alameda Co.: near Newark, *Burtt Davy* 1110, May 6, 1895 (U. C., G.); Mt. Eden, *K. Brandegee*, May 14, 1893 (G., U. C.; Gray spec. marked *S. macrotheca* var. *leucantha*, a form with roseate petals, by B. L. Robinson for Syn. Fl. N. Amer.). Napa Co.: Napa River levee at Cuttings Wharf, *J. T. Howell* 10803, October 8, 1932 (Cal. Acad.). Marin Co.: Corte Madera, *J. M. Bigelow*, 1853–4 (G., U. S.,[2] only part of the collection, the other plant being *Spergularia media* (L.) C. Presl); along roadside at edge of salt marsh at Stinson Beach, *G. B. & R. P. Rossbach* 606, May 26, 1938 (G., D. S., U. C., U. S.); Point Reyes, *Burtt Davy* 6773, June 18, 1900 (U. C., showing both lax, long-stemmed and matted, short-stemmed plants). Sonoma Co.: Bodega Point, *Eastwood* 4796, June 29, 1915 (U. S., G.); Bodega, *Katherine Brandegee*, June, 1905 (U. C.). Mendocino Co.: Mendocino, *H. E. Brown* 878, August, 1898 (G., U. S., a large cushion-forming plant with short internodes); Mendocino, *Jos. McMurphy* 39, July, 1903, (U. S., D. S., with long internodes). Humboldt Co.: plentiful in a salt flat between Eureka and Arcata, *Heller* 13780, July 9, 1923 (U. S., D. S.); Arcata, *M. E. Jones* 28873, July 16, 1931 (U. C., Pom.); salt marshes, Eureka,

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leaves. This is true anywhere on the coast with similar variable habitats and therefore makes var. *scariosa* (Britt.) Robins. untenable.

[1] These three collections were made at the same time within a few feet of each other and show characteristic plants of *S. macrotheca* and of var. *scariosa* (Britt.) Robins. with transition stages. It may be seen that sheltered plants grow lax and longer-leaved, while plants in exposed places become compressed mats with shorter eaves. This is true anywhere on the coast with similar variable habitats and therefore makes var. *scariosa* (Britt.) Robins. untenable.

[2] Cited under *Spergularia rubra* by Torrey, Pacific R. R. Report., Botany iv. 70 (1857).

Eastwood & Howell 3782, July 3, 1936 (Cal. Acad., G.). Del Norte Co.: Castle Island, near Crescent City, *Mrs. G. Earle Kelly*, June, 1924 (Cal. Acad.). California without definite locality: Lower Sacramento, *Wilkes' Explor. Exped.* (U. S.);[1] from sands in California, but collected from Berlin Bot. Gard., *Schlechtendal*, 1825 (B. TYPE, fragment G., photo. of fragment D. S.).[2] OREGON: Curry Co.: tide-lands, mouth of Chetco River, *Henderson* 9988, June 4, 1929 (Ore., U. C.). Coös Co.: banks and thickets, Marshfield, *H. D. House* 4989, September 1, 1912 (U. S.). Lane Co.: salt marshes, Florence, *Henderson* 16506, August 7, 1934 (Ore.). Lincoln Co.: beach, Seal Rock, 10 mi. s. of Newport, *M. E. Peck* 7269, September 5, 1917 (G.); Yachats, *Sweetser*, August 30, 1909 (Ore.); moist cliffs along the coast, Yaquina Bay, *Henderson*, July 12, 1881 (Ore., seeds small, around 0.6 mm. long, but plant lax and long-internoded, characteristic of the species). Tillamook Co.: tide-flats of Tillamook Bay, Bay Ocean, *Henderson* 11549, July 31, 1929 (Ore.); salt marshes, Tillamook, *T. Howell*, July, 1882 (Ore.). WASHINGTON: Pacific Co.: in marsh, tide-flat, North Cove, *A. S. Forster* 826, July 26, 1908 (U. S.). Clallam Co.: high beach, mouth of Quillayute River, *I. C. Otis* 1557, July 31, 1927 (W.); moist ground on sandspit at Port Angeles, *J. W. Thompson* 7852, August 10, 1931 (U. S., G., D. S., seeds 0.6–0.7 mm. long). San Juan Co.: Argyle, San Juan Island, *S. M. & E. B. Zeller* 937, June 25–August 1, 1917 (U. S.); Kanaka Bay, San Juan Island, *Lucile Roush*, June 29, 1919 (D. S.). BRITISH COLUMBIA: vicinity of Victoria, Vancouver Island, *John Macoun* 12, August 13, 1893 (U. S.); Victoria, *John Macoun* 2781, June 18, 1887 (U. S.); rock-crevices, Gonzales Point, Victoria, *C. F. Newcombe*, July 21, 1919 (D. S., Newcombe); Java Rocks, Haro Strait, *W. A. Newcombe*, May 7, 1934 (D. S., Newcombe).

The habit of *S. macrotheca* varies from robust, long-noded, many-stemmed plants growing in rich, alkaline mud, to sprawling, slender, few-flowered ones inhibited by the crowding of other plants, or to short-stemmed, matted plants with crowded internodes, growing on cliffs exposed to sea-winds. This latter phase has been called var. *scariosa* by Britton and others, because of short internodes and heavy, glandular pubescence. More valuable diagnostic characters, such as

[1] Cited under *Spergularia rubra* by J. Torrey, Wilkes. Explor. Exped. xvii., Botany, 247 (1874).

[2] Cham. & Schlecht. in Linnaea, i. 53 (1826), published a previously inedited, botanical garden name of Hornemann for a plant growing in the Berlin Botanical Garden from seeds collected in sands of California by *Chamisso*. The plant in the Berlin Herbarium, a fragment of which is cited above, as in the Gray Herbarium, may then be taken as the type for *Arenaria macrotheca* Hornem., even though there should be a specimen at Leningrad where the chief collection of *Chamisso* is to be found (there is none in the first duplicate set in Berlin), the botanical garden plant would be the type because it was from that that the species was described.

seeds, stipules, flower- and fruit-measurements, all are the same as in more characteristic robust specimens of the species. In collecting almost anywhere on the cliffy shores of California, all stages in length of internode, size of plant and degree of pubescence may be found within a few feet of each other, one always finding that the scrubbiest plants grow in the most exposed places. Examples of this may be seen among the many collections from the Monterey peninsula, in collections made by the author at Half Moon Bay, San Mateo Co. (see note under citations), in the *Copeland* collection from Montara Point, San Mateo Co., among the many collections from San Francisco, and in the collection of *J. Burtt Davy* from Point Reyes, Marin Co. In addition, this compressed plant has no geographic range separate from that of the species.

Tissa pallida Greene was described: "plant stout, very light colored" and it grew on "bluffs near the sea, back of Lake Merced" near San Francisco. The plant has capsules fully mature, so perhaps it was past its prime and losing some of its fresh green color. The plant is also far from stout for this species but like the common form on the moist sea-bluffs where it hangs in dense mats. Therefore, since all the diagnostic measurements are the same as those of *S. macrotheca*, there is nothing to distinguish this plant from the species.

The type of *Tissa valida* Greene from Santa Cruz Island is a robust, glandular, heavily fruiting plant very characteristic of the common run of plants throughout the coast. There are no diagnostic characters making it different from the rest.

At first there seems reason for keeping *Tissa Talinum* Greene from Guadalupe Island, Mexico, as an entity because of its extremely short-internoded habit and crowded, spreading, fleshy leaves, with a leafless, strict inflorescence standing definitely above the foliage. Even though some of the Guadalupe Island plants have no match in habit anywhere else, there are plants there which do have some bracts in the inflorescence (*Howell* 8329) and do not have a strict inflorescence standing high above the foliage (*Palmer* 864). The leaves are very variable, being linear-filiform, nearly glabrous, 2–5 cm. long and 1 mm. wide, as often as very fleshy, densely glandular-pubescent, 1–2 cm. long and 3 mm. wide, with all stages between. One can scarcely use leaves as a diagnostic character. Guadalupe Island plants are always suffrutescent but so is the species often, throughout its range. This habit may be due to the drastic, desert

conditions upon the island. The seeds of Guadalupe plants measure 0.5–0.7 mm. long. Although the seeds of *S. macrotheca* are usually 0.7–0.9 mm., they are occasionally 0.6 mm. long, as in the following collections: *Munz* 6608, San Clemente Island; *Newell*, Pacific Grove; *Thompson* 7852, Port Angeles, Washington. All of these collections are plants with long internodes and characteristic habit of the larger specimens of the species, and do not suggest the habit of any of the Guadalupe Island plants. It is significant that the collection of *Marcus E. Jones* from San Clemente Island, 1926, which has a habit somewhat suggesting *T. Talinum* in its spreading, densely fascicled leaves and erect, crowded inflorescence, has seeds all the way from 0.6 to 0.9 mm. in length. The collections of *T. S. Brandegee*, 1894, from San Clemente Island approach in habit the Guadalupe Island plants of *Palmer* but have seeds about 0.8 mm. long. The measurements of stipules and styles and the number of stamens are the same as in *S. macrotheca*, while measurements of capsule and sepals are included within the range of variation of, although smaller than the average of the species. All these facts, showing that *Tissa Talinum* is not consistently distinct in any character, make its taxonomic standing very weak.

2. Var. LEUCANTHA (Greene) Robinson (PLATE 589, FIG. 1d and MAP 2). *Sepals* ovate-lanceolate, *never attenuate*, 4.5–7 mm., usually 5–6 mm. long; *petals white* or rarely pink-tinged,[1] 4.5–7 mm., usually 5–6 mm. long, usually equal to or sometimes as much as 1 mm. longer than or shorter than the calyx; *styles 1.2–1.8 mm. long: mature capsules* 5.5–8 mm. long, rarely equal to the calyx,[2] usually *exceeding it by as much as 0.5–3 mm.; seeds* same as in the typical variety except that all examined were winged or rarely rimmed, and often shining.—Robins. in Proc. Am. Acad. xxix. 313 (1894) & in Gray, Synop. Fl. i. 253 (1897); Jepson, Fl. Calif. 493 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Fl. S. Calif. 164 (1935). *Tissa leucantha* Greene, Pitt. i. 301 (1889) and Man. Bot. San Francisc. Bay, 36 (1894). *T. macrotheca* var. *leucantha* (Greene) Jepson, Fl. W. Mid. Calif. 170 (1901). *Alsine leucantha* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *T. leucantha* var. *glabra* Davidson in Bull. S. Calif. Acad. Sci. xxv. 84 (1926). *S. macrotheca* var. *glabra* (Davids.) Munz, Fl. S. Calif. 164

[1] The following have pink-tinged flowers: Stockton, *E. E. Stanford* 838 (U. S.); 5 miles n. of Tulare, *Abrams* 12022 (Pom.); San Jacinto, *Street & Durant* (Pom.). Specimens of all these collections are in the Dudley Herbarium of Stanford University but there the flowers are either white or discolored brown. The lack of pink color is probably due to poisoning.

[2] To be seen in plant from half way between Kerman & Mendota, Fresno Co., *Keck & Stockwell*, 3350, in which the calyx is distinctly equal to the capsule.

(1935).—NORTH AMERICA: only in California, in low, alkaline places of the interior valleys from San Diego Co. north to Colusa Co. CALIFORNIA: San Diego Co.: Santa Maria, *Alderson* June, 1894 (U. C., G.). Riverside Co.: roadside in damp soil, San Jacinto, *Street & Durant*, May 12, 1918 (Pom., D. S.); vicinity of Perris, *H. M. Hall* 531, May 13, 1897 (U. C.). San Bernardino Co.: strongly alkaline soil, San Bernardino, *Feudge* 566, May 10, 1924 (Pom.); in alkaline soil, San Bernardino Valley, *S. B. Parish* 11719, April 13, 1918 (Cal. Acad.), same, April 20 (G.); vicinity of San Bernardino, *S. B. Parish* 4755, May 11, 1901 (D. S., Pom.). Los Angeles Co.: Studebaker, *Braunton* 307, May, 1902 (U. C., U. S.), in part;[1] near Dry Lake, Antelope Valley, *Burtt Davy* 2256, May 9–24, 1896 (U. C.); alkaline flats with *Adelia neo-mexicana*, 5 miles west of Lancaster on Antelope Valley Road, *Ferris & Rossbach* 9479, May 13, 1938 (D. S., G., calyx pubescent); roadside, Lancaster, *Roxana S. Ferris* 916, June 12, 1918 (Cal. Acad., D. S.). Tulare Co.: Goshen, *K. Brandegee*, May 9, 1916 (U. C.); 5 miles north of Tulare, *Abrams* 12022, May 2, 1927 (Pom., D. S.); alkaline flats, Hanford, *Kearney* 19, June 10, 1907 (U. S.). Kern Co.: Dry Lakes, Mohave Desert, *Davidson* 3618, May, 1926 (Pom., D. S.), type collection of *Tissa leucantha* var. *glabra* Davidson. Fresno Co.: in alkali, on flood plains of San Joaquin River, half way between Kerman & Mendota, *Keck & Stockwell* 3350, May 17, 1935 (D. S., calyx equal to capsule). Merced Co.: alkaline plains, 10 mi. sw. of Merced, *J. T. Howell* 1465, May 2, 1926 (Cal. Acad.). San Joaquin Co.: Lathrop, *Greene*, April 30, 1889 (U. C., U. S.), TYPE COLLECTION of *Tissa leucantha* Greene. Contra Costa Co.: Antioch, *K. Brandegee*, May, 1893 (G.). Solano Co.: Vanden, *K. Brandegee*, April 30, 1893 (G.); Vanden, *Eastwood* September 20, 1893 (G.). Yolo Co.: between Woodland and Davis, *Abrams* 12601, May 8, 1928 (Pom., D. S.). Sutter Co.: edge of tule land, *Copeland* 8273, May 29, 1903 (Pom.), det. by Greene. Colusa Co.: near Willows, *Burtt Davy* 4272, May, 1898 (U. C.); Colusa Junction, *K. Brandegee*, April, 1889 (G.).

This variety is easily distinguished from the typical form of the species by its longer stems and longer internodes, white flowers, usually more protruding capsule and somewhat longer style. It would be interesting to study flower-color in the field, for a few specimens in herbaria (see note above) seem to have pink flowers. Since flower-color may change in drying, it may be that flowers of the species are not always pink or rosy and that those of the variety are not always white.

Under *Tissa leucantha*, Greene cites three localities. The collection

[1] Both the species and var. *leucantha* were mounted on the same sheet. Since these were supposedly collected from the same place it is interesting to note that even where the two entities come together their diagnostic characters remain distinct.

from Lathrop is taken as the type. There are no *Greene* collections from Byron Springs and eastern Livermore Valley either at the University of California or the United States National Herbarium. These have not yet been located at Notre Dame but I venture to say that, because of the region from which they came, both the latter collections are probably of var. *longistyla.*

Var. *glabra* Davidson is characterized by being entirely glabrous. Careful examination of the type shows no other difference from the type or general collections of var. *leucantha.* The collection, *Ferris & Rossbach* 9479, taken not far from Davidson's type locality, however, shows pubescent calyces. I do not believe that a general absence of pubescence unsupported by other differences, even when the plants are all found in a given region, warrants their segregation as a variety.

3. Var. **longistyla** var. nov. (tab. 589, fig. 1e et 1f), sepalis ovato-lanceolatis, numquam attenuatis, 5.8–7 mm. longis; petalis albis, 5.8–7 mm. longis, sepala aequantibus vel eis 1 mm. longioribus vel brevioribus; stylis 3, ad basim divisis, 2–3 mm. longis: capsulis maturis, 4.6–6 mm. longis, sepala aequantibus vel eis ad 1.8 mm. brevioribus: seminibus eis var. typicae similibus aliquando autem fere nigris et argenteis, plerumque lineis vermiformibus dense intertextis profunde sculptis, areolis inter sculpturam parvis tumulis crebris.—California: only in central California. Alameda Co.: Niles, *M. E. Jones*, April 10, 1934 (U. C., Pom.); Livermore, *Michener & Bioletti*, April, 1892 (U. S., U. C.); eastern Livermore Valley, *J. T. Howell* 13739, April 10, 1938 (Cal. Acad., good flowers); alkaline marsh along roadside, 1.5 miles west of Altamont, *G. B. & R. P. Rossbach* 611, June 5, 1938 (G. type, D. S., U. S., Cal. Acad., U. C., Pom., B., Ore., N. Y., F. M.); alkaline mud, roadside, 1 mile n. of Mountain House, half way between Altamont and Tracy, *G. B. & R. P. Rossbach* 613, June 5, 1938 (G., D. S., Cal. Acad.); alkaline marsh along roadside about 1.5 miles east of Altamont, *G. B. & R. P. Rossbach* 614, December 30, 1937 (G.). Contra Costa Co.: Byron Springs, *Burtt Davy*, May, 1898 (U. C.); Byron Springs, *Eastwood* 11667, April 28, 1923 (Cal. Acad.); near Martinez, *Burtt Davy*, 6659, June 7, 1900 (U. C.). Napa Co.: Calistoga, *Eastwood* 4639, June 5, 1915 (Cal. Acad., G., U. S.); Calistoga, *Eastwood*, May 7, 1900 (G.); Calistoga Geyser, *M. S. Baker* 2111a, May 1, 1927 (D. S.); damp adobe meadow opposite Myrtledale Geyser, 1.5 miles north of Calistoga, *Bacigalupi* 1254, March 27–28, 1926 (D. S., Pom.); plentiful in stiff adobe near one of hot springs at Calistoga in the blue oak belt, *Heller* 13849, April 12, 1924 (U. S., D. S.); Myrtledale Hot Springs near Calistoga, *J. T. Howell* 1759, March 27, 1926 (Cal. Acad., D. S.); Myrtledale Hot Springs, *Eastwood & J. T. Howell* 5518, May 15, 1938 (Cal. Acad.).[1] Map 3.

[1] Tulare Co.: 15.7 miles north of Tulare, *F. R. Lawson R.* 62, April 5, 1930 (D. S.)

This variety is distinguished from var. *leucantha* by its longer style, sculptured seeds and never protruding capsule but is similar in lax, long-internoded habit and white flowers. It differs from the typical variety in having white flowers and much longer style. All three entities are similar in fasciculation of leaves, in stipules, and in size of seed.

S. macrotheca itself occasionally has deeply sculptured seeds and the seeds of var. *longistyla* may have the surface softly hubbled and the sculpture only partially evident.

One plant[1] with pink flowers was found at the type locality. This had the capsule equal to and slightly exceeding the calyx, a short style 1.2 mm. long and smooth brown seeds with only delicate traceries and therefore is characteristic *S. macrotheca*.

4. S. MEXICANA Hemsl. (PLATE 589, FIGS. 4a–4c and MAP 4). *Suffruticose perennial: tap-root fibrous-farinaceous, tapering gradually, often becoming 1 cm. thick: caudex* well developed, knotty, branched or unbranched, bearing many (often 20–25) diffuse stems, 3–15 cm. long; *internodes of stem below the inflorescence* slender, 3–20, usually 6–13 mm. long, 0.5–1 mm. in diameter: *leaves* not fascicled (but sometimes small, leafy branches in the axils), linear-filiform, glabrous, mucronate, 5–15 mm. long, 0.5–1 mm. wide: *stipules* inconspicuous, triangular-acuminate, scarious, 2–5 mm. long; *inflorescence* a lax cyme, 1.5–8 cm. long, with lower foliaceous *bracts* duplicating the vegetative leaves but becoming minute above, 2–5 mm. long, *internodes* glandular-pubescent, duplicating vegetative ones: *sepals* ovate-lanceolate, glabrous or with sparse, minute, glandular pubescence, scarious-margined, 2–4 mm. long; *petals* white, ovate, 1.2–2.4 mm. long; *stamens* 10; *styles* 3, 0.2–0.4 mm. long, dividing to base as the ovary matures: *mature capsules* 3–5 mm. long, exceeding calyx by 0.5–1.5 mm.: fruiting pedicels filiform, glandular-pubescent, often reflexed, the lower 2.5–10 mm. long: *seeds brown, rounded in outline, somewhat sculptured in delicate, vermiform pattern, densely covered with large, glandular papillae which are often cup-shaped*, 0.4–0.6 mm. long, *not winged*.—Hemsl. Diagn. Plant. Nov. pt. ii. 17 (1879) and Biol. Centr. Am. i. 72 (1879). *S. neglecta* sensu Hemsl. Biol. Centr. Am. i. 72 (1879), as to citation, Parry & Palmer 58, non *S. neglecta* Syme, Eng. Bot. ii. 129 (1864).[2]

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has the style 3 mm. long and, though lacking mature capsules or seed, is probably var. *longistyla*, although all other collections in this vicinity have styles not over 1.8 mm. long and are var. *leucantha*. There is need of field investigation and mature specimens to check upon this locality.

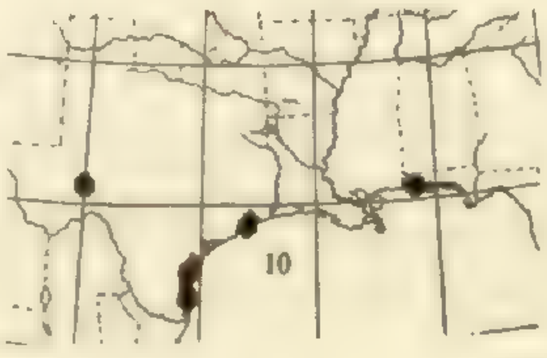
[1] 1.5 miles west of Altamont, Alameda Co., *G. B. & R. P. Rossbach* 612, June 5, 1938 (D. S.).

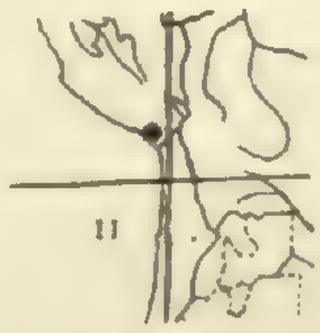
[2] Which has its source in *Lepigonum neglectum* Kindb., Syn. Lepig. 6 (1856). Later in Kindberg, Mon. Lepig. 37 (1863), *L. neglectum* was given as a synonym of *L. salinum* (J. & C. Presl) Fries, which in turn is a synonym of *Spergularia marina* (L.) Griseb.

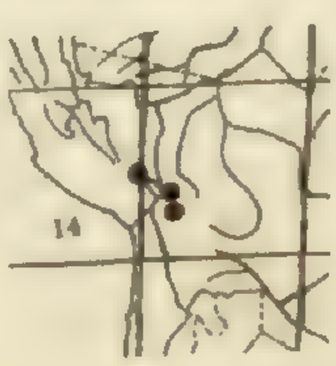
Tissa mexicana (Hemsl.) Britton in Bull. Torr. Bot. Club xvi. 129 (1889). *Alsine mexicana* (Hemsl.) House in Am. Midl. Nat. vii. 134 (1921), not *A. mexicana* Bartl. ex Presl, Rel. Haenk. ii. 14 (1825), which is *Minuartia verna* (L.) Hiern fide Prof. Johann Mattfeld in Fedde, Repert. Spec. Nov. Beihefte xv. 172 (1922). North America: known only in Mexico in the states of San Luis Potosí and Hidalgo. Mexico: San Luis Potosí: region of San Luis Potosí, alt. 6000–8000 ft., *Parry & Palmer* 52, 1878 (G., U. S.), type collection, type at Kew, not seen; same data 58, 1878 (G.), type collection of *Spergularia neglecta* Hemsl., type at Kew, not seen; in sands around city, San Luis Potosí, *Schaffner* 137, 1876 (G.), 539, 1879 (U. S., Cal. Acad., B.). Hidalgo: bare hills above Pachuca, alt. 8500 ft., *Pringle* 6913, July 21, 1889 (G., U. S., B., W., U. C., Pom.).

5. S. **atrosperma**, spec. nov. (tab. 589, fig. 3a–3c). Annua: caulibus 1–8, erectis vel patentibus, 5–18 cm. longis: internodiis caulis partium efloriferarum gracilibus, glabris vel villoso-glandulosis, 4–35 mm. longis, 0.5–1.0 mm. crassis; foliis linearibus, carnosis, glabris vel villoso-glandulosis, mucronatis, non fasciculatis, 10–25 mm. longis, 0.5–1.2 mm. latis; stipulis late triangularibus, acuminatis, saepe paullo longioribus quam latis, 1.8–2.8 mm. longis: internodiis cymae filiformibus, glabris vel pubescenti-glandulosis, infimis 10–25 mm. longis: bracteis foliosis, supremis minimis; sepalis ovato-lanceolatis, glabris vel pubescenti-glandulosis, 2.8–4 mm. longis; petalis ovatis, albis vel roseis, 2–2.6 mm. longis; staminibus 4–8, saepe 1–2 abortivis vel ad basim connatis; stylis 0.5–0.8 mm. ad basim divisis: capsulis maturis 3.2–5 mm. longis, sepalis 0.6–1.4 mm. longioribus: pedicellis fructiferis reflexis vel non, filiformibus, plerumque pubescenti-glandulosis, aliquando glabris, 4–8 mm. longis: seminibus nigris, saepe iridescentibus,[1] lineis vermiformibus intertextis areolatis sculptis, saepe profunde sculptis, haud papillatis, 0.6–0.8 mm. longis, non alatis vel aliquando ala imperfecta parva fusca scariosa vel margine angusto nigro.—*Tissa diandra* sensu Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in small part, including only the collection "Sierra Valley, *Lemmon*," the remaining collections being of true *S. diandra* and *S. echinosperma*, *q. v.*; sensu Greene, Fl. Francisc. 128 (1891), entirely as to plants discussed; non *Arenaria diandra* Guss. (1827). *Spergularia diandra* sensu Robins. in Proc. Am. Acad. xxix. 310 (1894), in small part, including only the collection "Goshen, *Brandegee*," the remaining plants being *S. diandra* and *S. echinosperma*, *q. v.*, non *Arenaria diandra* Guss. (1827).—North America: only in alkaline places in California and adjacent Nevada. California: Temecula, Riverside Co., *M. E. Jones*, April 24, 1882 (Pom.); dry mud-flat, ½ mile south of Lake Elsinore, Riverside Co., *Munz* 5075, April 29, 1922 (Pom.); plains, Tulare, Tulare Co., *K. Brandegee*, April, 1889 (G.); Goshen, Tulare Co., *K. Brandegee*, April, 1893 (G.); Los Banos Hills, Merced Co., *J. T. Howell* 13826, May 28, 1938 (Cal. Acad. type.

[1] These seeds are black but often have an iridescent tinge over the black.







Ranges of, 1, SPERGULARIA MACROTHECA (typical); 2, S. MACROTHECA var. LEUCANTHA; 3, S. MACROTHECA var. LONGISTYLA; 4, S. MEXICANA; 5, S. ATRO-SPERMA; 6, S. CANADENSIS and var. OCCIDENTALIS; 7, S. MARINA (with papillose seeds); 8, S. MARINA (with smooth seeds); 9, S. MARINA var. TENUIS; 10, S. ECHINOSPERMA; 11, S. CONGESTIFOLIA (also S. COLLINA); 12, S. ARBUSCULA; 13, S. FASCICULATA; 14, S. ANDINA; 15, S. DEPAUPERATA.

G., D. S., U. S., K., B.); clay soil, dried bed of former rain-pool, 7½ miles sw. of Merced on Los Banos Road, San Joaquin Valley, Merced Co., *J. T. Howell* 4145, April 11, 1929 (Cal. Acad.); Merced Co., *Mangst*, May, 1886 (U. C.); moist alkali, south slope about 3 mi. up the canyon, Corral Hollow, San Joaquin Co., *York*, April 2, 1935 (D. S.); 4 miles east of Williams, alkali plains, Colusa Co., *Roxana S. Ferris* 509, April 12, 1917 (D. S.); Colusa Junction, Colusa Co., *Brandegee*, April, 1889 (G.); Sierra Valley, Sierra Co., *Lemmon*, June 22, 1874 (G.). Nevada: alt. 5000 ft. south of Carson City, Ormsby Co., *M. E. Jones*, June 2, 1897 (U. S., Pom.). Map 5.

S. atrosperma differs from *S. diandra* in having larger seeds, which are more coarsely sculptured and have an iridescent tinge, longer stipules, and usually a slightly larger capsule. Otherwise the two species may be easily confused. Examination of many Old World specimens of *S. diandra* has convinced me that the seeds of *S. atrosperma*, though similar, are too large to be included in the Old World species.

6. S. diandra (Guss.) Boiss. (Plate 589, figs. 5a–5c). Annual: with 2–∞ slender, prostrate or diffuse stems, 5–15 cm. long: *internodes of stem below the inflorescence* slender, glandular-pubescent to nearly glabrous, 4–23 mm. long, 0.4–1.2 mm. in diameter; *leaves* linear, glandular-pubescent, shortly mucronate, 10–25 mm. long, 0.5–1 mm. wide; *stipules small, deltoid, acuminate, often slightly longer than broad*, 1–2 mm. long; *internodes* of inflorescence glandular-pubescent, the lowest 7–18 mm. long; *bracts* foliaceous, becoming minute above, 2–15 mm. long: *sepals* ovate-lanceolate, blunt-tipped, glandular-pubescent, 2.6–3.6 mm. long; *petals* rosy or white with pink toward the apices, ovate, 1.8–2.8 mm. long, as much as 0.5–1.2 mm. shorter than the calyx; *stamens* 4–7; *styles* 3, separated to the base, 0.4–0.6 mm. long; *mature capsules almost globose*, 2.6–4 mm. long, equal to or as much as 0.5 mm. longer than the calyx: *fruiting pedicels* filiform, glandular-pubescent, erect or spreading, 4–11 mm. long: *seeds black with a silvery tinge, pyriform, usually sculptured in interwoven, vermiform pattern, so that there are narrow, short, molded ridges between*, occasionally nearly smooth, sometimes with scattered, small, black papillae, 0.4–0.5 mm. long, not winged.—Fl. Orient. i. 733 (1867); Robins. in Proc. Am. Acad. xxix. 310 (1894), in part, including only the Oregon and Washington plants, excluding the California and Texan collections which are *S. atrosperma* and *S. echinosperma* respectively. *Arenaria diandra* Guss. Prod. Sic. i. 515 (1827). *A. salsuginea* Bunge in Ledeb. Fl. Alt. ii. 163 (1830); Ledeb. Ic. Pl. Fl. Ross. Alt. Illus. v. t. 409 (1834), although no previous author cited. *Alsine diandra* (Guss.) Guss. Fl. Sic. Syn. i. 501 (1842); House in Am. Midl. Nat. vii. 134 (1921). *Spergularia salsuginea* (Bunge) Fenzl in Ledeb. Fl. Ross. ii. 166 (1844–46); Robins. in Gray, Synop. Fl. 251 (1897). *Lepigonum diandrum* (Guss.) Nym. Syll. Fl. Eur. 250

(1854–55); Kindb. Synop. Lepig. 7 (1856), as to source of name not as to plants described.[1] *L. salsugineum* (Bunge) Fisch. & Meyer, Ind. Sem. Hort. Petrop. i. 10 (1835); Kindb. Synop. Lepig. 7 (1856) and Mon. Lepig. 42. t. iii. fig. 30 (1863). *S. atheniensis* Heldr. & Sart. ex Nym. Consp. 123 (1878–1882), an herbarium name given as a synonym of *S. diandra* (Guss.) Boiss. *Tissa diandra* (Guss.) Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, including only *Suksdorf* and *Henderson* collections, excluding the Californian and Texan collections; Brandegee, Proc. Calif. Acad. ser. 2. ii. 131 (1889), as to source of name, not as to plants discussed which are *S. marina;* Howell, Fl. Nw. Coast, 89 (1903), in part, including Columbia valley plants, excluding the Texan plants. *Buda diandra* (Guss.) Kuntze, Rev. Gen. 50 (1891). *S. salsuginea* var. *bracteata* Robins. in Gray, Synop. Fl. i. 251 (1897), in part, including the Oregon and Washington plants, excluding the Texan collections. *Tissa bracteata* (Robins.) Small, Fl. Se. U. S. 418 (1903), in part, including only the Washington plants, excluding the Californian and Texan collections. *T. diandra* var. *bracteata* (Robins.) Piper in Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 264 (1906), in part, including the *Suksdorf* collections, excluding *Sandberg & Leiberg* 346, which is *S. marina;* Piper & Beattie, Fl. Se. Wash. and Adjac. Idaho, 98 (1914). *S. bracteata* (Robins.) Nelson & Macbride in Bot. Gaz. lxi. 30 (1916); St. John, Fl. Se. Wash. and Adjac. Idaho, 144 (1937). *Alsine bracteata* (Robins.) House in Am. Midl. Nat. vii. 134 (1921).—North America: introduced from the Old World[2] into Oregon, Washington, and Idaho in the Columbia and Snake River valleys; and perhaps locally in Massachusetts and Georgia. Oregon: roadsides, Oswego, Clackamas Co., *Howell,* June, 1888 (Ore.); muddy shore of Columbia River, on Hayden Island, opposite Vancouver, Wash., *J. C. Nelson* 2958, Oct. 11, 1919 (G.). Washington: sandy bank of the Columbia River, w. Klickitat Co., *Suksdorf* 176, September, 1883 (G.); same loc. and collector, 2082, October 18, November, 1891 (G., U. S., U. C.); sandy river bank, Bingen, w. Klickitat Co., *Suksdorf* 2082, September–November, 1904, April, 1891 (U. C., D. S., Ore.). Idaho: gravel bars, alt. 3500 ft., Boulder Creek, Owyhee Co., *Macbride* 514, July 31, 1910 (G., U. S., D. S.).

The following specimens agree well but not exactly with the above plants. They are placed here for lack of thorough knowledge of Old World species to one of which they certainly must belong.

Massachusetts: Patuisset Island, Pocasset, Bourne, Barnstable Co., *J. A. Cushman* 8512, August 14, 1912 (New England Bot. Club). Georgia: Biltmore Herbarium, no collector, 1685a, Camden Co., March 29, 1902 (D. S., Pom.).

(*To be continued*)

[1] Later in 1863, Kindberg, Mon. Lepig. 35, refers this to *Lepigonum campestre* Kindb., which equals *S. Bocconi* (Scheele) Foucaud.

[2] Old World specimens from Spain, Greece, Tripoli, Morocco and Central Asia have been examined by the author.

SPERGULARIA IN NORTH AND SOUTH AMERICA

RUTH P. ROSSBACH

(*Continued from page 83*)

7. S. RUBRA (L.) J. & C. Presl (PLATE 589, FIGS. 6a–6c). Annual or short-lived perennial: *caudex* simple, bearing 3–∞ diffuse or prostrate stems which in turn may branch several times, 3–33 cm. long; *internodes of stem below the inflorescence* slender, glabrous, rarely sparsely glandular-pubescent, 2–35 mm. long, 0.5 mm. or less in diameter: *leaves* fascicled, linear-filiform, strongly mucronate, scarcely fleshy, 3.5–25 mm. long, 0.4–1.2 mm. wide, usually glabrous, or sometimes glandular-pubescent: *stipules* conspicuous, triangular-acuminate, usually shining, but sometimes dull, white or reddish, 2.5–5 mm., usually 3.5–5 mm. long: *inflorescence* a leafy, many-flowered cyme with *internodes* usually sparsely glandular-pubescent, not markedly differentiated from the lower parts of the stem; *bracts* duplicating leaves at the lower nodes, often smaller at the upper, sometimes only 2 mm. long: *sepals* lanceolate, usually glandular-pubescent, often densely so, 3.5–5 mm., usually 4–4.5 mm. long; *petals* pink, ovate, 2.4–3.8 mm. long, always shorter than the sepals; *stamens* 6–10, usually 10 but when less in number aborted ones are often present; *styles* 3, 0.6–0.8 mm. long, divided to base; *mature capsules* 3.5–5 mm. long, equaling the calyx: *fruiting pedicels* filiform, glandular-pubescent, reflexed or not, the lower 3.5–13 mm. long: *seeds* dark brown, rounded or if crowded in the capsule, truncate at the summit and angular in outline, deeply sculptured in closely interwoven, vermiform pattern with minute, dark, hard papillae scattered over the surface, most numerous on and often confined to the swollen rim, 0.4–0.6 mm. long, not winged.—Fl. Čechica, 94 (1819); C. Presl, Fl. Sic. 160 (1826); Gray, Man. 65 (1848), also through ed. 4., and Gen. ii. 28, pl. 108 (1849); Torrey, Pacific R. R. Report—Botany, iv. 70 (1857), probably not as to plants described (Corte Madera collection was of *S. media* and *S. macrotheca, q. v.*);[1] Syme, English Bot. ed. 3. ii. 129, pl. 254 (1873), good figure; Torrey, Wilkes Explor. Exped. xvii, Botany, 247 (1874), probably not at all as to plants described, which include a mixture of presumably all the common species of the Pacific coast; Chapman, Fl. So. U. S. ed. 2, 48 (1884), not as to plants described which are *S. marina, q. v.;* Robins. in Proc. Am. Acad. xxix. 309 (1894); Robins. in

[1] Martinez collection has not been found.

Gray, Synop. Fl. i. 250 (1897); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 91 (1901), though probably not as to plants described; Robins. & Fernald in Gray, Man. ed. 7, 378 (1908); Henry, Fl. So. Br. Columbia & Vancouver Island, 118 (1915); Rydberg, Fl. Prair. & Plains, 322, fig. 205 (1932); St. John, Fl. Se. Wash. and Adjac. Idaho, 144 (1937). *Arenaria rubra* L. Sp. Pl. i. 423 (1753) and Fl. Suec., ed. 2. 152 (1755); Smith, Eng. Bot. xii. 852 and fig. (1801), figure poor; Fries, Fl. Hall. 76 (1818);[1] DC. Prod. i. 401 (1824); Torrey, Fl. N. and Mid. U. S. 456 (1824); Cham. & Schlecht. in Linnaea, i. 53 (1826), probably not as to plants described which are a mixture of species made insufficiently clear to separate; Hooker, Fl. Bor.-Am. i. 98 (1830), including only the *Scouler* collection, excluding the collection "Canada, *Mrs. Percival*" which is *S. canadensis*;[2] Hooker & Arnott, Bot. Beechey Voy. 11 (1830), not as to plants discussed, for they refer to Cham. & Schlecht. l. c.; Bigelow, Fl. Bost., ed. 3, 191 (1840); Hooker & Arnott, Bot. Beechey Voy. 325 (1840), only in part as to plants, but references deal with mixtures of species. *Alsine rubra* (L.) Crantz, Inst. ii. 407 (1766),[3] excluding β.; C. A. Mey. Verz. Pfl. Cauc. 217 (1831); Webb & Berth. Phyt. Canar. i. 148 (1840); House in Am. Midl. Nat. vii. 133 (1921). *Arenaria campestris* Allioni, Fl. Pedem. ii. 114 (1785), Linnaean phrase-name quoted.[4] *Stipularia rubra* (L.) Haworth, Syn. Pl. Succ. 103 (1812). *Lepigonum rubrum* (L.) Wahlb. Fl. Gothob. 45 (1820); Koch, Syn. Fl. Germ. et Helv. ed. 2, i. 121 (1843); Wimm. Fl. Schles. ed. Goepp. i. 78 (1844); Kindb. Synop. Lepig. 5 (1856) and Mon. Lepig. 40, t. iii, fig. 29 (1863), figure good; Wats. Smithson. Misc. Coll. no. 258 (Bibl. Index), 103 (1878). *Buda rubra* (L.) Dumort. Fl. Belg. 110 (1827); Wats. & Coulter in Gray, Man. ed. 6, 89 (1889). *Melargyra rubra* Raf. Fl. Tellur. iii. 81 (1836), no reference to Linnaeus nor to anyone else, *nomen nudum*. *Spergula rubra* α Torrey & Gray, Fl. N. A. i. 175 (1838) (β is *S. marina* and γ is *S. media*). *Spergula rubra* (L.) Dietr. Syn. Pl. ii. 1598 (1840); Darby, Bot. So. States, 244 (1866), not as to plants described which are probably *S. marina*, *q. v.* *Spergula marina* Dufour ex Steud. Nom. ed. 2. ii. 617 (1841), *nomen nudum* given as a synonym of *Arenaria rubra* L. *Spergula maxima* Dufour, l. c., *nomen nudum*, given as synonym of *A. rubra* L. *Lepigonum rubrum* γ *perennans* Kindb. in Bot. Not. 10 (1858) and Mon. Lepig. 41 (1863). *Spergularia campestris* (L.) Aschers. Fl. Brandenb. i. 94 (1864);[5]

[1] This reference is given by Index Kewensis under *Lepigonum* but that combination is only implied and *Arenaria rubra* was the actual name used.

[2] The other two collections, *Dr. Richardson* and *Mr. Morrison*, have not been found in the Kew Herbarium.

[3] Does not refer to Linnaeus directly but gives the Linnaean phrase-name under *Arenaria rubra*.

[4] The epithet *campestris* here probably has its source in *Arenaria rubra* α. *campestris* L. Sp. Pl. i. 423 (1753). The citations of *A. rubra* α *campestris* by many European authors subsequent to and referring to Linnaeus are left out of the synonymy above because the identity of α *campestris* is not known (see discussion).

[5] Has its source in *Arenaria rubra* α. *campestris* L. but *S. rubra* is clearly described.

Rohrb.[1] in Mart. Fl. Bras. xiv. pt. 2, 267 (1872), not as to South American plants discussed which are probably *S. villosa, q. v.*; Rohrb.[1] in Linnaea, xxxvii. 229 (1871–73), not as to plants discussed which are *S. villosa, q. v.;* Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.), 92 (1901), not as to plants discussed which probably are *S. Bocconi* or *S. villosa;* Hegi, Fl. Mit.-Eur. iii. 422, t. 108, fig. 1 (1911), figure good; Macbride, Field Mus. Nat. Hist. Pub. Bot. xiii.—Fl. Peru, pt. ii. no. 2, 631 (1937). *Spergularia rubra α campestris* (L.) Fenzl in Lebeb. Fl. Ross. ii. 167 (1844–46). *Spergularia rubra* var. *campestris* Gray, Man. ed. 5, 95 (1867), no author given for *campestris* but he probably referred to Linnaeus. *Fasciculus ruber* (L.) Dulac, Fl. Hautes-Pyr. 245 (1867). *Tissa rubra* (L.) Brandegee in Proc. Calif. Acad. ser. 2, ii. 131 (1889), collection cited not seen, though it may not be *S. rubra;* Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889); Greene, Fl. Francisc. 128 (1891); K. Brandegee in Zoe, iv. 84 (1893), no authority given for *rubra* but she undoubtedly referred to Linnaeus, certainly not as to plants discussed, since *T. Clevelandi* is a synonym for *S. villosa* although stated by Mrs. Brandegee to be *T.* "*rubra*, the perennial form"; Greene, Man. Bot. San Francisc. Bay, 36 (1894); Reiche, Fl. Chile, i. 196 (1896); Britt. & Brown, Illus. Fl. ii. 37, fig. 1516 (1897); Howell, Fl. Nw. Coast, 89 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 263 (1906); Piper & Beattie, Fl. Se. Wash. & Adjac. Idaho, 97 (1914) and Fl. Nw. Coast, 145 (1915); Wooton & Standley, Contrib. U. S. Nat. Herb. xix. (Fl. New Mex.) 235 (1915); Rydberg, Fl. Rocky Mts. 279 (1917), also ed. 2 (1922); Tidestrom, Contrib. U. S. Nat. Herb. xxv. (Fl. Utah and Nevada) 197 (1925). *Tissa campestris* (L.) Prantl in Engler & Prantl, Naturl. Pflanzenfam. iii. 1b, 85 (1889). *Corion rubrum* (L.) N. E. Brown in Syme, Eng. Bot. ed. 3. Suppl. 48 (1891). *Tissa rubra* var. *perennans* (Kindb.) Greene, Pitt. ii. 229 (1892); Jepson, Fl. W. Mid. Calif. 170 (1901); Piper, Contrib. U. S. Nat. Herb. xi (Fl. State Wash.) 264 (1906). *Spergularia rubra* var. *perennans* (Kindb.) Robins. in Gray, Synop. Fl. N. Am. i. 250 (1897); Jepson, Fl. Calif. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Man. So. Calif. 163 (1935). *Buda campestris* (L.) Kuntze, Rev. Gen. iii. pt. 2, 13 (1898), at least partly, not as to plants, which are *S. villosa*. *Spergula campestris* (L.) Murb. in Lunds Univ. Arsskrift, xviii. no. 3. 33 (1922), in obs.—NORTH AMERICA: in sandy or gravelly soils, chiefly of roadsides, railroad tracks, and waste places. Newfoundland, south to Maryland (rarely to Alabama), westward locally to Michigan; Vancouver Island to southern California, eastward locally to Montana, Idaho, Wyoming and New Mexico. Also occurring locally in South America, in Colombia and Chile. Introduced from Europe. NEWFOUNDLAND: St. John's, *Fernald & Wiegand* 5369, July 31, 1911 (U. S., B.). ISLE ST. PIERRE: Savoyard, *Le Hors* xxv–2a, September 6, 1934 (G.). QUEBEC: Newport, Gaspé Co., *Victorin et al.* 44900, August 1, 1931

[1] I have seen no specimens marked *Spergularia campestris* by Rohrbach.

(G.). Prince Edward Island: High Bank, Kings Co., *Fernald & St. John* 11050, July 29, 1914 (G., U. S., U. C., coarse perennial). New Brunswick: Rexton, Kent Co., *Blake* 5734, September 24, 1923 (G., U. S.). Nova Scotia: sandy roads and wastes, Halifax, Halifax Co., *Macoun* 320, May 19, 1883 (U. S.). Maine: Dover, Piscataquis Co., *Fernald* 379, August 5, 1895 (G., U. S., N. E. B. C.); Biddeford Pool, York Co., *Kennedy*, July 23, 1901 (G., N. E. B. C.). New Hampshire: Carroll, Coös Co., *Pease* 12696, July 13, 1910 (N. E. B. C.); Rye, Rockingham Co., *B. L. Robinson* 702, June 14, 1903 (G., N. E. B. C., a large perennial). Vermont: Mt. Holly, Rutland Co., *W. W. Eggleston* 148, July 8, 1898 (G., N. E. B. C.). Massachusetts: Sharon, Norfolk Co., *Poole* 86, August 1896 (G.); Oak Bluffs, Martha's Vineyard Island, *Seymour* 1198, June 28, 1916 (G., N. E. B. C., U. S.). Rhode Island: Westerly, Washington Co., *Woodward*, July 20, 1917 (G.); Old Harbour, Block Is., Newport Co., *Fernald, Hunnewell, and Long* 9471, August 21, 1913 (G., N. E. B. C., a large, short-noded plant). Connecticut: Winsted, Litchfield Co., *Blewitt* 654, June 30, 1909 (N. E. B. C.). New York: Brooklyn, *Heuser*, August 25, 1893 (B.). New Jersey: West New York, Hudson Co., *Van Sickle*, June 10, 1895 (U. S.); Scotts, Middlesex Co., *Mackenzie*, May 28, 1922 (G.). Pennsylvania: between Churchtown Road and Beartown, Lancaster Co., *Heller* 508, September 6, 1892 (G., U. S.). Maryland: near Baltimore, *J. D. Smith*, May 9, 1878 (U. S.). District of Columbia: Washington, *A. Ruth* 205, May 25, 1912 (Cal. Acad.). Alabama: in saline sand on shore, Westfowl River, *C. Mohr*, June, 1870 (D. S.). Michigan: near Litchfield, Hillsdale Co., *W. T. Wallace*, July 7, 1896 (G.). Idaho: Moscow Mts., Latah Co., *Eastwood & Howell* 3172, June 24, 1936 (G., Cal. Acad.); Santianne Creek Bottoms, Kootenai Co., *Leiberg* 1029, June 24, 1895 (U. C., Ore., Pom.); Clearwater R. between Lewiston and Lapwai, Nez Perces Co., *G. B. & R. P. Rossbach* 309, July 26, 1936 (G.). Wyoming: Old Faithful, Yellowstone Nat. Park, *P. H. Hawkins* 521c, July 2–7, 1922 (U. S., scrubby with short internodes); Norris Geyser Basin, Yellowstone Nat. Park, *E. A. Mearns* 3153, August 10, 1902 (U. S., D. S., a very large plant, typical of what Kindberg and Greene meant by var. *perennans*). New Mexico: Albuquerque, *C. L. Herrick*, September 25, 1894 (U. S.). Montana: Granite, Granite Co., *F. D. Kelsey*, July 15, 1892 (D. S., Pom.). California: Upland, Riverside Co., *I. M. Johnston* 117, May 6, 1917 (U. C., D. S., Pom.); Pacific Grove, Monterey Co., *C. Dudley*, August, 1926 (Cal. Acad., a scrubby short-noded plant); Wanona, Mariposa Co., *J. T. Howell* 365, June 2, 1924 (Cal. Acad.); San Francisco, *Greene*, April 22, 1891 (U. S., Notre Dame, U. C., cited by Greene in Pitt. ii. 229 as basis for his var. *perennans* and, although a coarse perennial, not larger than is characteristic for *S. rubra*); Metcalf's Ranch, near Mt. Eddy, Siskiyou Co., *Heller* 12126, July 18, 1915 (G., Cal. Acad., D. S.). Oregon: Siskiyou, Jackson Co., *Eggleston* 11507, August 6–7, 1915 (U. S.);

Seal Rock, Lincoln Co., *M. E. Peck* 10550, August 15, 1921 (D. S.); Sisters, Crook Co., *Roxana S. Ferris & Rena Duthie* 547, June 27, 1919 (D. S.); Lower Albina, Portland, Multnomah Co., *E. P. Sheldon* S.10316, May 12, 1902 (G., U. S., Ore., D. S., Pom.). WASHINGTON: Columbia River, w. Klickitat Co., *Suksdorf* 2081 (G., U. S., U. C., D. S.); Satsop, Chehalis Co., *A. A. & E. G. Heller* 4026, July 8, 1898 (G., U. S., U. C., B.); Lake Crescent, Clallam Co., *Geo. N. Jones* 3593, August, 1931 (W.); near Friday Harbor, San Juan Island, *N. K. Berg* 7, Sept. 28, 1904 (D. S.). BRITISH COLUMBIA: Victoria, Vancouver Island, *C. F. Newcombe,* May 28, 1912 (Newcombe). MEXICO: San Luis Potosí, *Schaffner* 1371b, 1876 (G.). COLOMBIA: Bogota, *Perez Arbelaez* 1198, August, 1931 (U. S.). CHILE: PROV. CONCEFCION: Dept. Concepcion, Concepcion, *Claude-Joseph* 4940, November 19, 1927 (U. S.); Penco, Bahia de Concepcion, *Barros* 279, November 6, 1937 (G.). PROV. BIO-BIO: Dept. Traiquen: Puren, *Claude-Joseph* 5926, January, 1929 (U. S.). PROV. CAUTIN: Dept. Imperial: Riberas de Cholchol, *Montero* 2010, November 30, 1934 (G.). PROV. VALDIVIA: Dept. Valdivia: Corral, *Claude-Joseph* 3268, November 11, 1925 (U. S.).

In general habit *S. rubra* varies from small prostrate plants with short internodes, forming a turfy mat, to large, slender-stemmed, diffuse plants with very long internodes. Since all other characters, such as type of stipule, sepal, capsule, and seed are ever constant, these general habit-differences, which are probably due to ecological conditions, do not warrant any special recognition. Var. *perennans*, described by Kindberg from Sweden as a perennial with very long stems, and later taken up by Greene, Robinson, Jepson, and others, differs from the species in none of the fundamental characters. Large perennials with either long or short internodes can be found anywhere within the range and probably are perennial because of favorable conditions.

In the Linnaean Herbarium there are two specimens under *Arenaria rubra*. One is marked *rubra* and with the number 6 which is the number of the species under *Arenaria* in Sp. Pl. i. 423 (1753). The plant agrees exactly in all characters with the species under discussion. This plant, labeled 6. *rubra*, is, then, the TYPE SPECIMEN of *Arenaria rubra* L.[1]

The other sheet[1] filed under *rubra* is marked only by the number 6. and a sign ⊖, meaning Hasselquist. There is no name or other inscription upon the sheet. The plant is stouter than the last, with deltoid, shorter, non-lacerate stipules, more fleshy leaves and larger

[1] Photograph in Gray Herbarium through the courtesy of Mr. C. A. Weatherby.

capsules protruding beyond the calyx. Since there are no seeds present on the plant, one does not dare to say exactly what it is but it surely resembles *S. marina*. Whether this was incorrectly thought to belong to *Arenaria rubra*, or is the type of α. *campestris* or of β. *marina* no one can now say. β. *marina* L. does not need this specimen as type for there are others which are probably the basis for this variety which has its origin in L., Hort. Cliff. (see discussion of *S. marina*).

This brings up the question of the identity of *Arenaria rubra* α. *campestris* L. As is shown above, probably no type of α. *campestris* exists in the Linnaean Herbarium. The fact that Linnaeus says in Sp. Pl. i. 424 (1753) under *Arenaria rubra*,

> "*Habitat* α. *in* Europae *arenosis collibus*, β. *in litoribus marinis. Stamina in campestri certe* 10 *sunt; in maritima prope Aboam stamina tantum 5 observavit D. Kalm*",

shows that he was comparing only two entities, and not three. He presumably considered α. *campestris* and β. *marina* as two parts of a composite species and therefore α. *campestris* is that part of *A. rubra* which is not β. *marina*.

8. S. Bocconi (Scheele) Foucaud (Plate 589, figs. 7a–7c). Annual: *caudex* bearing 1–many diffuse, much branched stems 5–30 cm. high; *internodes of stem below the inflorescence* usually glabrous, the upper occasionally glandular-pubescent, 6–33 cm. long, 0.8–1.6 mm. in diameter: *leaves not fascicled* or only slightly so, mucronate, fleshy, 10–45 mm. long, 0.4–1 mm. wide, usually glabrous, occasionally glandular-pubescent above; *stipules* deltoid, 2–4 mm. long, *dull white, scarcely acuminate: inflorescence* sometimes a lax cyme but more often densely filled with many short-pedicelled flowers giving a crowded appearance; *internodes* glandular-pubescent, the lowest 5–25 mm. long and 0.4–0.8 mm. in diameter; *bracts* foliaceous and glabrous below, minute and glandular-pubescent above, 1–30 mm. long: *sepals* ovate, glandular-pubescent, 2.4–5.4 mm. long; *petals* white, pink or rosy, 1.6–3.2 mm. long, as much as 0.4–1.2 mm. shorter than the calyx; *stamens* 6–10; *styles* 3, separated to the base, 0.4–0.6 mm. long: *mature capsules* 2.8–5.4 mm. long, equal to or as much as 1 mm. longer than the calyx: *fruiting pedicels* filiform, glandular-pubescent, usually not reflexed, the lowest 4–23 mm., usually 4–12 mm. long, the upper mostly much shorter: *seeds light brown, often silver-tinged, usually very plump with a broad, swollen rim, surface irregularly reticulated or roughened, minutely glandular-papillate*, 0.4–0.6 mm. long, *not winged*. —Foucaud ex Merino in Mem. Soc. Esp. Hist. Nat. ii. 496 (1904). *Alsine Bocconi* Scheele in Flora, xxvi. 431 (1843).[1] *Lepigonum diandrum*

[1] Scheele gives a reference to *Arenaria Bocconi* Soleirol, which was previously pub-

sensu Kindb. Synop. Lepig. 7 (1856),[1] non *Arenaria diandra* Guss. (1827). *L. campestre* Kindb. Mon. Lepig. 35, t. iii. fig. 23 (1863). *Spergularia atheniensis* Aschers. in Schweinfurth, Beitr. Fl. Aethiop. 305 (1867).[2] *S. campestris* (Kindb.) Nym. Consp. 123 (1878), non *S. campestris* (L.) Aschers. Fl. Prov. Brandenb. 94 (1864), which has its source in *Arenaria rubra α. campestris* L. (1753). *Tissa luteola* Greene, Pitt. v. 114 (1903). *Corion atheniense* (Aschers.) Merino, Fl. Galic. i. 519 (1905). *Alsine atheniensis* (Aschers.) Druce in Proc. Linn. Soc. 77 (1907). *Alsine luteola* (Greene) House in Am. Midl. Nat. vii. 134 (1921).—NORTH AND SOUTH AMERICA: introduced from the Old World to the Pacific coast of North America from California to Oregon and in a few of the largest cities of temperate South America. CALIFORNIA: San Fernando, Los Angeles Co., *Abrams* 6606, July 7, 1917 (D. S.); Avalon, Santa Catalina Island, Los Angeles Co., *John I. Carlson*, June 13, 1915 (Cal. Acad.); back dunes, Surf, Santa Barbara Co., *Munz* 11381, May 17, 1929 (G., Pom.); Pacific Grove, Monterey Co., *Heller* 6797, May 28, 1903 (Notre Dame, G., U. S., Ore., D. S., Pom., U. C., type collection of *Tissa luteola* Greene); alkali country, 3 mi. sw. of Merced, Merced Co., *J. T. Howell* 1003, May 9, 1925 (Cal. Acad.); foothills west of Los Gatos, Santa Clara Co., *Heller* 7499, June 13, 1904 (G., U. S., B., D. S., U. C.); Durant Ave., by cement walk, Berkeley, Alameda Co., *H. A. Walker* 603, June 7, 1907 (U. C.); San Francisco, San Francisco Co., *K. Brandegee*, June, 1889 (G., marked *S. salina* var. *sordida* Robins. Synop. Fl. N. Am.). OREGON: Lower Albina, Portland, Multnomah Co., *E. P. Sheldon* S.9932 July 21, 1902 (Ore.); ballast, Linnton, *J. C. Nelson* 702, June 17, 1916 (G., D. S.). CHILE: Valparaiso, Prov. Aconcagua, *Mauricio Berth* 934, October, 1930 (G.); Concepcion, Prov. Concepcion, *Jaffuel* 2912, December, 1931 (G.); Concepcion, Prov. Concepcion, *Claude-Joseph* 3901 (U. S.). ARGENTINA: Alrededores de La Plata, Las Talas, Prov. Buenos Aires, *Cabrera* 1825, November 1, 1931 (La Plata); without indicated locality, *Hicken* 480 (G., Cal. Acad.). URUGUAY: Pocitos-Malvin, Montevideo, *Herter* 70449, June, 1924 (B.); Montevideo, *Sello* 2295d (B., one marked *L. rubrum* by Kindb., 1861); ad margine viarum, Montevideo, *Gibert* 990 (K.); without indicated locality, *Gibert* 169, July, 1868 (K.).

S. Bocconi thrives in ballast and along sidewalks and roadsides. It is easily distinguished from *S. rubra* by its shorter stipules, more fleshy, not densely fascicled leaves, and its smaller seeds. It is

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lished by Steudel, Nom. ed. 2. i. 123, 125 (1840), as a synonym, without description, for *Arenaria media* and which has its source in an herbarium name.

[1] Although the description is insufficient to indicate whether Kindberg was really describing the same plant as Gussone (1827), the situation is cleared by Kindberg in Mon. Lepig. 35 (1863) where he cites this reference as synonymous with *L. campestre*, which undoubtedly is the plant under discussion here.

[2] *Spergularia atheniensis* Aschers. has its source in an herbarium name, *Spergularia rubra* β. *atheniensis* Heldr. & Sart. published as a synonym of *Lepigonum campestre* by Kindberg, Mon. Lepig. 35 (1863).

quickly separated from *S. marina* by its smaller capsules and smaller, silvery-tinged seeds.

9. S. CANADENSIS (Pers.) G. Don (PLATE 589, FIGS. 2a–2d and MAP 6). Annual: with 1–many, *prostrate or decumbent, widely branching stems* 3–25 cm. long; *internodes of stem below the inflorescence* glabrous, 3–25 mm. long, 0.4–1.4 mm. in diameter: *leaves* linear, fleshy, blunt, not mucronate, glabrous, 6–45 mm. long, 0.6–2 mm. broad; *stipules deltoid, as long as or shorter than broad,* 1–2.8 mm. long: *inflorescence* open, leafy, not differentiated from the lower parts of the plants; *internodes* 3–28 mm. long, 0.4–0.8 mm. in diameter; *bracts* 3–35 mm. long: *sepals ovate, blunt, always glabrous,* 2.2–3.2 mm. long; *petals* white or pink, ovate, 1.6–2.6 mm. long, occasionally equal to, usually 0.4–1 mm. shorter than the calyx; *stamens* 2–5, usually 3–4; *styles* 3, separated to the base, 0.3–0.4 mm. long: *mature capsules* 3.6–5.2 mm. long, as much as 0.8–2.6 mm. longer than the calyx or *once-and-a-half to twice the length of calyx: fruiting pedicels* filiform, usually reflexed, glabrous, rarely sparsely glandular-pubescent, 4–15 mm. long: *seeds brown, dull, rounded at the summit, surface nearly smooth or with minute and irregular reticulate thickenings,* occasionally with ridges near the point of attachment, *very often with long, delicate, glandular pubescence, especially on the swollen rim at the summit,* 0.8–1.4 mm., usually 1–1.3 mm. long, *often entirely or partially surrounded by a white, erose wing* about 0.3 mm. wide, *or not at all winged.*—Gen. Hist. Dichl. Pl. i. 426 (1831), in part as to plants, including "capsules rather globose . . . valves broad and blunt," excluding "hispid" plants which were probably *S. marina;* Robins. & Fernald in Gray, Man. ed. 7. 378 (1908); Fernald & Wiegand in RHODORA, xii. 161 (1910); J. K. Henry, Fl. So. Brit. Columb. and Vanc. Isl. 118 (1915) (the plants discussed probably belong to the variety of this species). *Arenaria rubra* β. Michx. Fl. Bor.-Amer. i. 274 (1803). *A. canadensis* Pers. Syn. i. 504 (1805), based upon the Michaux plant; Pursh, Fl. Am. Sept. i. 319 (1814); DC. Prod. i. 401 (1824); Steud. Nom. ed. 2. i. 123 (1840). *A. rubra* sensu Hook. Fl. Bor.-Am. i. 98 (1830) in part, including the references *A. canadensis* Pers. and Pursh, excluding all other references which probably belong to *S. rubra* and *S. marina,*[1] non L. (1753). *Melargyra canadensis* Raf. Fl. Tellur. iii. 81 (1836), *nomen nudum. Lepigonum canadense* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), *nomen nudum. Alsine canadensis* (Pers.) Heynh. Nom. 38 (1840); House in Am. Midl. Nat. vii. 134 (1921). *Arenaria marina* sensu Bigelow, Fl. Bost. ed. 3, 191 (1840), in part, including reference *A. canadensis* Pers., non *A. rubra* var. *marina* (L.) 1753. *Spergula canadensis* (Pers.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum medium* sensu Wats. Smithson. Misc. Coll.

[1] Hooker here seemed to include all North American Spergularias under *A. rubra* L. Of the four specimens cited, Canada, *Mrs. Percival,* is *S. canadensis;* Straits of De Fuca, *Dr. Scouler,* is *S. rubra; Dr. Richardson's & Mr. Morrison's* collections have not been seen by the author.

No. 258.—(Bibl. Index), 103 (1878), in part, including only those synonyms referring to *S. canadensis*, excluding those referring to *S. media* and *S. marina*, non *Arenaria media* L. (1762). *Tissa salina* sensu Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889), as to description, non *Spergularia salina* Presl (1819). *Buda borealis* Wats. in Wats. & Coulter in Gray, Man. ed. 6, 90 (1889). *Spergularia borealis* (Wats.) Robins. in Proc. Am. Acad. xxix. 312 (1894) and in Gray, Synop. Fl. 252 (1897). *Tissa canadensis* (Pers.) Britton in Mem. Torr. Bot. Club, v. 152 (1894); Britt. & Brown, Ill. Fl. ii. 37, fig. 1515 (1897).—North America: in mud or muddy sand of the coast near upper tide limit and often covered by water at high tide, Newfoundland and Quebec to Long Island, New York; and along the southern coast of Alaska and the Queen Charlotte Islands.[1] Newfoundland: muddy brackish shore, Savage Cove, Straits of Belle Isle, *Fernald & Long* 28148, August 29, 1925 (G.); brackish or saline strand near Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss* 28147, August 5, 1925 (G.); muddy strand, Port Saunders, *Fernald & Wiegand* 3328, August 6, 1910 (G.); strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand* 3330, August 31, 1910 (G., U. S.); wet brackish sand, Stephenville Crossing, Bay St. George, *Fernald & Wiegand*, 3329, August 14, 1910 (G.); damp depressions in sand and gravel, back of barrier beach, Argentia, Avalon Peninsula, *Fernald, Long & Dunbar* 26646, August 26, 1924 (G.); without definite locality, *La Pylaie* (B.). Quebec: Saguenay Co.: moist sand of seashore, Bonne Esperance, *J. A. Allen* 43, August 28, 1882 (G.); rocky shore, limestone, Ile St. Geneviève, Mingan Islands, *St. John* 90412, September 9, 1915 (G., Can.); Ile du Havre de Mingan, *Victorin & Rolland* 25544, August 22, 1926 (G.); Ile à la Chasse, *Victorin & Rolland* 18869, July 26, 1924 (G.); gravelly shore, Pointe au Maurier, Charnay, *St. John* 90413, August 26, 1915 (G., Can.); salt marsh, Petites Bergonnes, *A. S. Pease* 24096, September 8, 1934 (G.). Charlevoix Co.: vicinity of Cap à l'Aigle, *John Macoun*, August 14, 1905, 66768 & 66770 (G.), 66769 (G., U. S.); marais saumâtre à l'est de la baie, Baie Saint Paul, *Victorin, Rolland & Jacques* 34089, August 23, 1930 (G., Cal. Acad., Can.). Temiscouata Co.: Notre Dame du Portage, *Victorin* 703, August, 1914 (G.); brackish margin of St. Lawrence River, Cacouna, *Collins & Fernald* (Pl. Exsicc. Gray 209) August 31, 1904 (G., U. S., D. S., U. C., Cal. Acad., W., Can.). Kamouraska Co.: muddy shore of St. Lawrence River, Ste. Anne, *Svenson & Fassett* 1099, August 10, 1923 (G.). Rimouski Co.: salt marsh, St. Lawrence R., Bic, *Fernald & Collins* 1030, July 25 & 26, 1907 (G., Can.); prairie saumâtre au bord de la mer, Sainte-Luce, *Victorin, Rolland & Jacques* 33215, August 20, 1930 (G.); salt marsh near the wharf, Bic, *Collins & Fernald*, July 15–18, 1904 (G.). Matane Co.: shore of salt marsh near mouth of Matane R. below high tide, Matane,

[1] Perhaps this occurs also on Vancouver Island, though more collections are needed to verify this supposition.

F. F. Forbes, August 6, 1904 (G.). Gaspé Co.: salt marsh at mouth of Rivière Ste. Anne des Monts, Tourelle, *Fernald & Smith* 25718, August 29, 1923 (G., Can., Cal. Acad.). Bonaventure Co.: brackish shore, New Carlisle, *Williams & Fernald*, July 28, 1902 (G.); marais saumâtres, Carleton, *Victorin, Rolland & Jacques* 33294, August 11, 1930 (G., Cal. Acad.). Anticosti Island: Anse au Sanatorium, *Victorin* 4211, August, 1917 (G., U. S., D. S.); Rivière aux Becsies, *Victorin* 4212, August 24, 1917 (G., U. S.). Without definite locality: embouchure du fleuve St. Laurent, *André Michaux* (Paris, TYPE, photograph in G.). Magdalen Islands: Cap aux Meules, Ile de l'Étang-du-Nord, *Victorin & Rolland* 9883, August 11, 1919 (G., U. S.) immature; wet brackish sand at the margin of a pond southwest of Étang-du-Nord village, Grindstone Island, *Fernald, Bartram, Long & St. John* 7431, July 24, 1912 (G.). Prince Edward Island: Prince Co.: salt marsh, Tignish, *Fernald, Long & St. John* 7429, August 6, 1912 (G., U. S., Can., Cal. Acad.); damp brackish sand, Alberton, *Fernald & St. John* 7432, July 11, 1912 (G., Can., U. S.). Queens Co.: border of salt marsh, Bunbury, *Fernald, Long & St. John* 7428, August 28, 1912 (G.); salt marsh, Mt. Stewart, *Fernald, Bartram, Long, & St. John* 7433, July 30, 1912 (G., Can., Cal. Acad., U. C.). New Brunswick: Gloucester Co.: brackish marsh along Middle River, Bathurst, *S. F. Blake* 5369, August 13, 1913 (G., U. S., W., Cal. Acad.); shore of Shippigan Island, Lameque, *Blake* 5538, August 26, 1913 (G., U. S.); sandy beach, Tracadie, *Blake* 5636, September 10, 1913 (G.). Northumberland Co.: beach of Miramichi Bay, Loggieville, *Blake* 5618, September 5, 1913 (G.); brackish sands, Bay du Vin Island, *Blake* 5703, September 18, 1913 (G.). Albert Co.: salt marsh, Upper New Horton, *Fassett* 2245, August 22, 1924 (G.). St. John Co.: salt marsh, Quaco, *Fassett* 2241, August 20, 1924 (G.). Charlotte Co.: salt marsh, Utopia, St. George, *Fassett* 2242, August 29, 1924 (G.); Grand Manan Island, *J. R. Churchill*, August 4, 1891 (G.). Nova Scotia: Cape Breton Co.: seashore, Sydney, *C. A. Hamilton* 18299, July, 1890 (Can.). Halifax Co.: on pebbly beach, Purcell's Cove, Halifax Harbor, *Howe & Lang* 1571, September 2–6, 1901 (G.). Kings Co.: sandy shore, Starr's Point, *Fernald*, August 23, 1902 (G.). Queens Co.: damp sand flats and tidal wash, Central Port Mouton, *Graves, Long & Linder* 21181, August 16, 1920 (G.). Shelburne Co.: upper border of gravelly strand, Villagedale, *Fernald, Long & Linder* 21188, August 7, 1920 (G., Can., U. S.). Yarmouth Co.: gravelly and rocky seabeach, Lower Argyle, *Fernald, Bissell, Graves, Long & Linder* 21189, August 11, 1920 (G.). Maine: Washington Co.: between tide marks, Eastport, *W. G. Farlow*, September, 1877 (G.); beach near Point of Main, Machiasport, *M. A. Barber*, August 24, 1898 (G.). Hancock Co.: beach at Broad Cove, Somes Sound, Mt. Desert Is., *C. E. Faxon*, September 4, 1895 (G.). Waldo Co.: sand and gravel along seashore, about at high-tide mark, west shore of 700-Acre Island, Islesboro, *G. B. Rossbach* 370, August 25,

1931 (N. E. B. C.). Cumberland Co.: salt marsh, Cumberland, *E. B. Chamberlain*, July 26, 1901 (G.); near shore, southwest part of Ragged Island, Casco Bay, *Rodney H. True*, September 4, 1921 (Penn.). York Co.: river bank, a mile from mouth, Kennebunkport, *Walter Deane*, July 12, 1894 (G.). NEW HAMPSHIRE: Rockingham Co.: Little Harbor, Rye, *E. F. Williams*, September 19, 1901 (G.); Hampton, *E. F. Williams*, September 22, 1901 (G.). MASSACHUSETTS: Essex Co.: Cape Ann, *J. B. Brinton*, August 2, 1884 (Cal. Acad.). Middlesex Co.: banks of Charles River, Cambridgeport, *B. L. Robinson*, September 18, 1898 (G.). Norfolk Co.: Fossil Ledge, Braintree, *Kennedy*, Nov. 30, 1888 (G.). Barnstable Co.: North Dennis, Cape Cod, *C. N. Brainerd*, July 14, 1879 (G.). CONNECTICUT: mud flats near shore of Long Island Sound, Old Lyme, *Woodward*, July 27, 1917 (G.). NEW YORK: Centerport, *A. C. Cook*, 1887 (U. S.). BRITISH COLUMBIA: San Juan Harbor, Vancouver Island, *Rosendahl* 2059, August 12, 1907 (G.); Tlell, Graham Is., Queen Charlotte Islands, *W. A. Newcombe*, July 24, 1925 (Newcombe). ALASKA: shores of Naha Bay at Loring, *Thos. Howell* 1615, August 15, 1895 (U. S., U. C.); sands covered at high tide, Bay of Pillars, Kuiu Island, *Henderson* 14665, August 19, 1932 (Ore.); Klawak, *A. & A. Krause* 554b (B.); margin of sea in tide flats, Sitka, *Luella G. Smith* 157, August 2, 1933 (Ore.).

S. canadensis may be quickly recognized by its decumbent habit and glabrous, fleshy stems and leaves, its capsules much exceeding the blunt sepals, and usually by its very large seeds. It differs from *S. marina* in having larger seeds (which, if they are glandular-papillose, have very long papillae) more protruding capsules, usually shorter sepals, and nearly always more glabrous surfaces. It differs from the introduced *S. media* in more prostrate growth, shorter stipules, smaller flowers and capsules, 2–5 stamens instead of 9–10, shorter styles, and usually larger seeds which may be glandular-pubescent.

The geographical distribution of *S. canadensis* is interesting because it is restricted to the northeastern and northwestern coasts. It has evidently never been collected anywhere between, on the Arctic coasts, although John Macoun[1] reports a collection from James Bay by *Burgess*. This specimen has not been located at the herbarium in Ottawa but the great probability is that it would belong to *S. canadensis* because the locality would be roughly in the same latitude as the known range. However, it may have been *S. marina*. Since this species is strictly maritime, often growing just below high-tide

[1] Geol. & Nat. Hist. Survey Canada—Cat. Canad. Pl. pt. i, 80 (1883).

limits, it would not be expected in the interior. Why it does not occur on the northern coasts is hard to say; but temperature is probably one limiting factor. There are other maritime plants with very similar broken ranges, such as *Polygonum Fowleri*[1] and *Senecio Pseudo-arnica*,[2] though the latter extends along the northeastern coasts of Asia. Professor M. L. Fernald also suggests *Coelopleurum lucidum* and *Glaux maritima* var. *obtusifolia* as having similar ranges.

10. Var. **occidentalis**, var. nov. Caulibus erectis, sparse villoso-glandulosis vel glabris: stipulis triangularibus, quam longis tam latis vel longioribus quam latis, 1.6–3.2 mm. longis: sepalis non obtusis, glabris vel villoso-glandulosis, 3–4.6 mm. longis; staminibus 2–5; stylis 3, ad basim divisis, 0.3–0.6 mm. longis: capsulis maturis 4.4–6.4 mm. longis, sepalis 0.4–2.4 mm. longioribus vel sepalis minus quam sesqui-longioribus: seminibus eis varietatis typicae similibus, quam-quam vulgo 0.9–1.1 mm. longis.—North America: Along the coast from northern California to Vancouver Island. California: salt marsh, Humboldt Bay, Humboldt Co., *Rattan*, June, 1878 (G.). Oregon: brackish mud-flat, 3 miles west of Tillamook, on road to Bayocean, Tillamook Co., *G. B. & R. P. Rossbach* 642, June 22, 1938 (G.); salt marsh, Bayocean, Tillamook Co., *Henderson* 11550, July 31, 1929 (U. C.). Washington: brackish clay near mouth of Palix River, Willapa Bay, 15 miles south of Raymond, Pacific Co., *G. B. & R. P. Rossbach* 644, June 26, 1938 (G. type, D. S., U. C., U. S., W., Cal. Acad., B.); brackish clay, Willapa Bay, just north of the Palix River, about 11 miles south of Raymond, Pacific Co., *G. B. & R. P. Rossbach* 645, June 26, 1938 (G., D. S., B., Cal. Acad., U. S., Ore., W.); salt marsh, Westport, Grays Harbor Co., *H. C. Cowles* 518, July 10, 1907 (G.); on the coast, Olympic Mts., Clallam Co., *Elmer* 2746, August, 1900 (D. S., Pom., Ore.); open muddy places in salt marsh, near Blyn at head of Sequim Bay, Clallam Co., *G. B. & R. P. Rossbach* 646, July 6, 1938 (G., D. S., Cal. Acad., U. C., B., W., Ore., F. M., Pom.); muddy tidewater, northern part of Hood Canal, 1 mile north of Brinnon, Jefferson Co., *G. B. & R. P. Rossbach* 649, July 6, 1938 (G., D. S., W., Ore.); salt marsh, 8 mi. north of Eldon on the Hood Canal, Jefferson Co., *G. B. & R. P. Rossbach* 651, July 6, 1938 (G., D. S., U. S., Cal. Acad., Pom., U. C., W., Ore., B.); salt marsh at mouth of Perry Creek, 5 miles north of Olympia, Thurston Co., *G. B. & R. P. Rossbach* 652, July 6, 1938 (G., D. S., U. C., Cal. Acad., U. S., B., W., Ore.); salt marsh at Steilacoom, Pierce Co., *G. B. & R. P. Rossbach* 654, July 7, 1938 (G., D. S., Cal. Acad., U. C., U. S., W., Ore.); shores of Puget Sound at Steilacoom, Pierce Co., *J. W. Thomp-*

[1] See map 25 in Fernald, Mem. Gray Herb. ii (Persistence of Plants in Unglaciated Areas of Boreal America) (1925).

[2] See map 28 in Fernald, l. c.

son 9960, August 22, 1933 (U. C., Pom., D. S., U. S.); wet hollows in beach at high tide line, Silverdale, Kitsap Co., *I. C. Otis* 1639, June 27, 1929 (W.); Fort Lawton, Seattle, King Co., *Eastwood* 9620, June 19, 1920 (Cal. Acad.); Seattle, King Co., *Piper* 694, June 20, 1889 (W.); Bellingham Bay near Whatcom, Whatcom Co., *Suksdorf* 954, July 15, 1890 (G., U. C.); Friday Harbor, San Juan Co., *N. K. Berg* 88, July 3, 1904 (D. S.). VANCOUVER ISLAND: Saanitch Inlet, *Newcombe*, September 12, 1917 (Newcombe); Esquimalt Indian Reserve, *Newcombe*, June 6, 1920 (Newcombe); Nanaimo, Discovery Bay, *Eastwood* 9870, June 26, 1920 (Cal. Acad.); vicinity of Nanaimo, *John Macoun* 78518, June 24, 1908 (Can.); Nanaimo, *John Macoun* 2761, June 10, 1887 (Can.); salt marshes, Nanoose Bay, *Carter* 508, September, 1916 (G., Newcombe); Comox, *John Macoun* 13, June 27, 1893 (Can.).

Var. *occidentalis* differs from the typical form of the species in having a more erect habit, often a more glandular pubescence, usually somewhat larger stipules and a capsule which does not so much exceed the calyx. These plants could not be called *S. marina* because of their large seeds which, if they are glandular-pubescent, have very long, slender papillae. They cannot belong to the introduced *S. media*, because the flowers and capsules are too small, the seeds sometimes pubescent, the stamens 2–5, instead of 9–10, and the styles usually too short. They are treated as a variety of *S. canadensis* because the seeds are like those of that species.

11. S. MEDIA (L.) Presl (PLATE 590, FIGS. 1a–1c). Annual or perennial (?): *caudex* bearing 1–∞ erect or prostrate stems 5–40 cm. tall; *internodes of stem below the inflorescence* 6–30 mm. long, 1–2.2 mm. thick, usually glabrous, occasionally the upper sparsely glandular-pubescent: *leaves* in fascicles of 1–3 in the axils, occasionally not fascicled, not mucronate or with a very short mucro, 10–50 mm. long, 0.8–2 mm. wide, glabrous or sometimes the upper sparsely glandular-pubescent; *stipules* deltoid, sometimes shortly acuminate, 2.5–6 mm. long, as long as or slightly longer than broad: *inflorescence* with *internodes* 3.5–30 mm. long, 0.4–0.8 mm. thick, and foliaceous *bracts* 1–25 mm. long, the upper minute: *sepals* narrowly ovate, 2.8–6 mm. long, usually 4–5 mm., glabrous, sometimes glandular-pubescent; *petals* white, ovate, 2.5–4.5 mm. long; *stamens* 9–10; *styles* 3, divided to the base, 0.5–1 mm. long: *mature capsules* 4.5–8 mm., usually 5.5–7 mm. long, sometimes equal to the calyx or as much as 4 mm., usually 1–2.5 mm. longer than the calyx: *fruiting pedicels* reflexed or not, usually glandular-pubescent, sometimes glabrous, 4–23 mm. long: *seeds* dark brown, smooth or very slightly roughened with low elongate mounds,[1]

[1] Especially noticeable in some of the collections from Chile and Juan Fernandez Islands.

not sculptured but sometimes with delicate, vermiform traceries, 0.6–1.1 mm., usually 0.8–1 mm. long, though occasionally not winged usually surrounded by a scarious, white or brown-tinged wing somewhat erose or entire at the margin, sometimes with a brown zone next to the seed, 0.1–0.4 mm. wide.—Fl. Sic. i. 161 (1826); Gray, Man. ed. 5, 95 (1867), as to source of name but not as to description which applies to smooth-seeded plants of *S. marina;* Rohrb. in Mart. Fl. Bras. xiv, pt. 2, 272 (1872), including only 1: "Forma capsula calyce sesqui vel duplo longiore" and the synonymy given; excluding 2. "Forma capsula calycem aequante . . .", which is a mixture of *S. ramosa* and *S. villosa;* Wats. Bot. King Exp. 42 (1871), as to source of name, but collection cited, *Watson* 177, is *S. marina* with smooth seeds; Rohrb. in Linnaea, xxxvii. 242 (1871–73), including only "1. Forma genuina," excluding "2. Forma capsula calycem aequante vel vix superante." for the most part, which is a mixture of *S. media, S. ramosa, S. villosa, S. colombiana,* etc.[1] and excluding "3. Forma dense caespitosa humilis capsula calyce breviore," which is *S. villosa, q. v.;* Robins. in Gray, Synop. Fl. i. pt. i, 252 (1897); Robins. & Fernald in Gray, Man. ed. 7, 379 (1908); Vallentin & Colton, Illus. Pl. Falkl. Is. 13 (1921), figure good; Macbride, Field Mus. Pub. Bot. xiii. (Fl. Peru pt. ii.) 632 (1937), not as to plant cited which is *S. fasciculata, q. v. Arenaria media* L. Sp. Pl. ed. 2, 606 (1762); Pers. Synop. i. 504 (1805); DC. Prod. i. 401 (1824); Hook. & Arn. in Hooker, Bot. Misc. iii. 147 (1832), including collections by *Gillies* and *Bridges,* excluding collections by *Cruckshanks* and *Cuming* 550 which are *S. villosa, q. v.;* Gay, Fl. Chile i. 267 (1845), as to source of name, but description applies to *S. villosa, q. v.;* Hooker, Fl. Antarct. i. pt. 2, 250 (1847), including also var. β. *A. marina* sensu Smith, Eng. Bot. xiv. 958 and fig. (1802), including β (in all probability the plants described are all *S. media*), non *A. rubra* β. *marina* L. (1753). *A. marginata* DC. in Lam. & DC. Fl. France, iv. pt. 2, 793 (1805) and Ic. Pl. Gall. Rar. 15, t. 48 (1808), figure good. *A. marginata* Schlecht. in Ges. Naturfors. Freunde Berl. Mag. vii. 212 (1816), very indefinite description. *Stipularia media* (L.) Haworth, Syn. Pl. Succ. 103 (1812). *Lepigonum medium* sensu Wahlb. Fl. Gothob. 46 (1820), gives *Arenaria rubra* β. *marina* L. as a synonym,[1] non *Arenaria media* L. (1762). *L. marinum* sensu Wahlb. l. c. 47, who gives *Arenaria media* L. as a synonym,[2] non *A. rubra* β. *marina* L. (1753). *L. medium* (L.) Fries, Nov. Fl. Suec. Mant. iii. 33 (1839); Koch, Syn. Fl. Germ. ed. ii, i. 121 (1843), in part, probably a mixture of *S. marina* and *S. media;* Kindb. Synop. Lepig. 14 (1856), as to source of name but probably not at all as to plants discussed because they are placed under "microtheca" and the capsule is described

[1] Here there is such an involved mixture of species among the citations and synonyms that an explanation is not attempted. However, the references and citations may be found in their place in the monograph.

[2] Wahlberg evidently interchanged the Linnaean epithets *marina* and *media* in making his new combinations.

as slightly exceeding calyx, which is more characteristic of *S. marina;* Kindb. Mon. Lepig. 24, t. ii, fig. 11 (1863), *S. marina* as to plants for same reason as above; Wats. Smithson. Misc. Coll. No. 258 (Bibl. Index) 103 (1878), as to source of name and including part of the synonyms, the remaining, too numerous to take up, pertain to *S. marina* and *S. canadensis;* Brewer & Wats. Geol. Survey of Calif. ed. 2, Bot. Calif. i. 71 (1880), probably *S. marina* as to description. *Spergula media* (L.) Bartl. in Bartl. & Wendl. Beitr. Bot. ii. 64 (1825). *Alsine marina* var. β. Mert. & Koch in Roehl. Deutsch. Fl. ii. 293 (1826), with *A. media* L. as a synonym. *Buda media* (L.) Dumort. Fl. Belg. 110 (1827). *Arenaria rubra* sensu Hook. & Arn. Bot. Beechey Voy. 11 (1830),[1] non L. (1753). *Alsine marginata* (DC.) C. A. Mey. Verz. Pfl. Cauc. 217 (1831), non *A. marginata* Schreb. Spicil. Fl. Lips. 31 (1771), which is a *Spergula;* Reichenb. Fl. Germ. 566 (1832); House in Am. Midl. Nat. vii. 133 (1921). *A. marginata* Fenzl, Verbreit. Alsin. tab. ad. p. 18 (1833), *nomen nudum. Melargyra media* Raf. Fl. Tellur. iii. 81 (1836), *nomen nudum. Spergula rubra* γ? Torr. & Gray, Fl. N. A. i. 175 (1838). *Aren. marina* var. β. Bertol. Fl. Ital. iv. 685 (1839). *A. maritima* Steud. Nom. ed. 2, i. 125 (1840), founded upon a name with pre-Linnaean basis but given as a synonym for *A. media* L. *Lepigonum marginatum* (DC.) Koch, Syn. Fl. Germ. ed. 2, i. 121 (1843). *Spergularia marginata* (DC.) Kittel, Taschenb. ed. 2, 1003 (1844); Boreau, Fl. Centr. Fr. ed. 3, ii. 106 (1857); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 91 (1901); Fernald & Wiegand in Rhodora xii. 161 (1910). *S. media* β. *marginata* (DC.) Fenzl in Ledeb. Fl. Ross. ii. 168 (1844–46). *Lepigonum marinum* (Wahlb.) Kindb. Synop. Lepig. 12 (1856), non *Arenaria rubra* β. *marina* L. (1753). *L. marinum* sensu Kindb. Mon. Lepig. 18, t. i, fig. 6 (1863), for the most part but excluding the synonyms *S. macrocarpa* Presl, *S. rupestris* Camb., *Arenaria rubra* β. *marina* L., *Arenaria marina* All. and others, non *Arenaria rubra* β. *marina* L. (1753). *A. litoralis* Philippi in Linnaea, xxviii. 673 (1856). *Spergularia rubra* sensu Torrey, Pacific R. R. Rep.—Bot. iv. 70 (1857), including only synonyms *A. media* L. and *A. marginata* DC., part of the Corte Madera specimen being *S. media,* the other plant *S. macrotheca,*[2] non *Arenaria rubra* L. (1753). *Lepigonum marinum* subsp. *dubium* Kindb. Mon. Lepig. 21, t. i, fig. 5 (1863). *Spergularia media* var. *macrocarpa* sensu Gray, Man. ed. 5, 95 (1869), excluding synonym *S. macrocarpa* Presl which pertains to *S. ramosa,* non *S. macrocarpa* Presl (1831). *Lepigonum medium* var. *macrocarpa* sensu Wats. Smithson. Misc. Coll. no. 258 (Bibl. Index) 103 (1878), non *Spergularia macrocarpa* Presl (1831). *Corion medium* (L.) N. E. Brown in Syme, Engl. Bot. ed. 3, Suppl. 49 (1891) and in Druce, Bot. Exch. Club Brit. Isl. Rep. for 1892 (1893). *Tissa marina* sensu Greene,

[1] There is a specimen in Herb. Hooker at Kew, *Beechey*, Concepcion, mounted on a sheet of *A. media* by Hooker.

[2] I have not been able to find the Martinez collection cited here.

Fl. Francisc. 128 (1891), non *Arenaria rubra* β. *marina* L. (1753); sensu Greene, Man. Bot. San. Francisc. Bay 37 (1894), non *A. rubra* β. *marina* L. (1753). *Buda marina* sensu Macloskie, Rep. Princeton Univ. Exp. Patagonia, viii. i. pt. 5, 395 (1905), non *A. rubra* β. *marina* L. (1753). *Alsine media* (L.) Druce in Ann. Scot. Nat. Hist. 221 (1906), based upon *Arenaria media* L. (1762), non *Alsine media* L. Sp. Pl. i. 272 (1753), which is a *Stellaria*. *Tissa marginata* (DC.) Heller, Muhlenbergia, vi. 96 (1910). *Spergularia maritima*[1] Chiov. in Ann. Bot. Roma, x. 22 (1912), no description but gives *A. marginata* DC. as a synonym. *Spergularia maritima* Hill ex Druce, Rep. Bot. Exch. Cl. Brit. Isles, iii. pt. 5, 438 (1914), as synonymous of *S. media* Presl. *S. alata* Wiegand in Rhodora, xxii. 15 (1920).—North and South America: introduced from Europe in New York at Shelter Island and in saline places in the interior; in Marin Co., California and in Oregon. Also in Chile, where it may not be introduced, from Prov. Santiago south to Chiloe; on the Juan Fernandez and Falkland Islands and about ports in Argentine and Uruguay. New York: head of Coscles Inlet, Shelter Island, *House* 9694, August 15, 1923 (G.); salt pond east of Montezuma, Cayuga Co., *Metcalf & Wiegand* 6406, July 4, 1916 (G., type collection of *S. alata* Wiegand); salt flats east of village, Montezuma, *Eames, Randolph & Wiegand* 12004, September 9, 1919 (G., cited under *S. alata* by Wiegand); on island by Cayuga Bridge, *Muenscher* 16953, August 5, 1927 (G.); saline clay about salt sheds, south of Liverpool, Syracuse, Onondaga Co., *Fernald, Wiegand & Eames* 14278, August 31, 1922 (G.); salt springs, Syracuse, Onondaga Co., *E. C. Webster* (G.); salt marsh, Syracuse, Onondaga Co., *Wiegand* 27, August 18, 1902 (G.); near Baldwinsville, *Beauchamp*, 1894 (G.); salt marsh, southeast corner of Onondaga Lake, Syracuse, Onondaga Co., *Wiegand* 6409, September 14, 1916 (G.); Onondaga Lake, *Kirkwood*, July, 1903 (U. S.). California: salt flats on south side of bridge across head of Drake's Estero, Marin Co., *Ferris & Wiggins* 8117, July 19, 1935 (G.); Almonte, Marin Co., *Eastwood*, July 15, 1920 (Cal. Acad.) and same locality, *Eastwood* 10595, June 9, 1921 (Cal. Acad.); Tiburon, Marin Co., *Michener & Bioletti*, April, 1891 (G.); Almonte, Marin Co., *Sutcliffe*, May 17, 1919 (Cal. Acad.); Sausalito, *K. Brandegee*, June, 1889 (G.). Oregon: salt marsh on tide-flats, Toledo, Lincoln Co., *J. C. Nelson* 2355, July 5, 1918 (G.); on ballast, Lower Albina, Portland, Multnomah Co., *Sheldon* S.9915, July 21, 1902 (Ore.). Chile: Prov. Aconcagua: Dept. Valparaiso: on shore at port of Valparaiso, *Philippi* 70 (B.); Algarrobo, *Germain*, October, 1836 (Santiago, photo. in G., type of *Arenaria litoralis* Philippi). Prov. Santiago: Dept. Santiago: Santiago, *Claude-Joseph* 2223, December, 1922 (U. S.); Santiago, *Philippi*, 1861 (K.); Careo, Santiago, *E. C. Reed* (K.). Dept. Meli-

[1] Based upon *A. maritima* All. 87 no. 119 (1774) which is the same as *A. maritima* All. Misc. Taur. (see note under discussion of *S. marina*), which is probably based upon *A. rubra* β. *marina* L. (1753) (see discussion under *S. marina*). The name *maritima* has its source in pre-Linnaean works and is in great confusion.

pilla: San Antonio, *Looser*, 1295, December 23, 1928 (G.); en terrenos arenosos terrosos, secos y asoleados de la orella del mar, Dunas, lado noete, San Antonio, *G. Montero* 232, October 16, 1927 (G.); San Antonio, *Claude-Joseph* 1765, October, 1921 (U. S.). PROV. CONCEPCION: Dept. Concepcion: Concepcion, *Beechey* (K., mounted on sheet of *A. media*); Concepcion, *Jaffuel* 330, January, 1912 (G.); Concepcion, *Claude-Joseph* 4086, November, 1925 (U. S.); Hualpén, *Barros* 267, December 10, 1937 (G.). Dept. Arauco: moist sand behind dunes of beach, *Pennell* 12908, March 6, 1925 (G., F. M.); Arauco, *Barros* 285, November 15, 1938 (G.). PROV. CAUTIN: Dept. Imperial: Saavedra?, *Hollermayer* 203, November, 1919 (B.); Budi, *Claude-Joseph* 3119, January, 1925 (U. S.). PROV. VALDIVIA: Dept. Valdivia: crevices of rocks within tide mark, Bay of Valdivia, *Bridges* 571 (K., mounted on sheet with *A. media*); Valdivia, *Bridges* vel *Cuming?* 256, 1862 (N. Y.); on seacoast at Corral, *Buchtien* 12968, January, 1902 (U. S.); Corral, *Philippi*, 1860 (K.); San Juan, *Gunckel* 1967, February 8, 1931 (G.); San Carlos, *Gunckel* 1988, February 15, 1931 (G.); Amargos, *Gunckel* 15114, February 18, 1930 (G.) and 1871, November 6, 1929 (G.); on the seashore to the north of the sand bar of Rio Bueno, *Hollermayer* 776, January 29, 1935 (G.). PROV. CHILOE: Dept. Ancud: sand flats behind beach, Ancud, *Pennell* 12558, February 6–7, 1925 (G.); muddy tidal flat, salt marsh, Isla de Mechuque, *Pennell* 12624, February 10, 1925 (G.), immature. Dept. Castro: Chiloe and Chonos, *E. C. Reed*, 1871 (G., K.). CHONOS ARCHIPELAGO: Tres Montes, *Darwin* 6, December, 1834 (K.). Without definite locality: *Philippi*, 1870 (B.); *C. Vohsenius*, 1860 (B.); mittleres Chile, *Claude-Joseph* (G.); Herb. *Link* 3, (B., marked *dubium*, *Lepigono marino* affine by Kindberg, 1861, type of *L. marinum* subsp. *dubium* Kindb.);[1] *Bridges* (B.). JUAN FERNANDEZ ISLANDS: Masafuera: Quebrada de las Casas, near the sea, *C. & I. Skottsberg* 411, February 24, 1917 (U. S., N. Y., K., seeds small, 0.6–0.7 mm., with elongate mounds but in habit similar to the specimens from the Falkland Islands). FALKLAND ISLANDS: Shallow Bay beach, W. Falkland Islands, *Vallentin*, 1909–1911 (G., K.); Falkland Islands, *Hooker f.*, 1839–1843 (G., K.). URUGUAY: Montevideo, *M. Arsène Isabelle*, 1838 (F. M.). ARGENTINA: PROV. BUENOS AIRES: proderas nimedas entre La Plata y Ensenada, *Cabrera* 1768, October 8, 1931 (G.); Buenos Aires, *Tweedie* (K.); Buenos Aires, *Gillies* (K., cited under *A. media* by Hooker).[2] Santa Cruz. Terr.: Port Desire, *Darwin* (K., immature).

There is a specimen correctly filed and labeled *media* in the Linnaean Herbarium,[3] which therefore can be designated as the TYPE of *Arenaria*

[1] Mon. Lepig. 21 (1863), also cited under *Spergularia media* by Rohrb. in Linnaea, xxxvii. 242 (1871–73).

[2] Bot Misc. iii. 147 (1832).

[3] Photograph by courtesy of Mr. C. A. Weatherby is in the Gray Herbarium. I am also greatly indebted to Mr. Weatherby for careful measurements of this type.

media L. The capsules measure 8–9 mm. long and have smooth, dull, dark brown seeds 0.6–0.8 mm. long, with broad wings 0.3–0.4 mm. wide. With such large capsules the plant could not possibly belong to *S. marina.*

S. media, so often confused with *S. marina,* differs from the latter in having larger capsules, usually larger seeds which are nearly always winged, petals white instead of pink or rosy, stamens 9–10 instead of 3–5, and a stouter, more erect, more glabrous habit. *S. media* may be easily distinguished from *S. macrotheca,* which has seeds so like as often to be indistinguishable, by its more glabrous habit, more protruding capsule, less fascicled leaves, deltoid, slightly acuminate stipules instead of lanceolate, strongly acuminate larger ones, white petals, and blunt sepals.

It may be noted in the description that there is great variability in size of seed and width of wing. Most of the Californian plants have large seeds, 1–1.1 mm. long, while Chilean plants usually have small seeds, 0.7–0.9 mm. long, though occasionally as large as 1 mm. Those of New York plants measure 0.8–0.9 mm. Since European plants have all these sizes of seeds, this variability is not significant. New York seeds have broad wings, 0.3–0.4 mm. wide, and Chilean seeds have wings 0.2–0.3 mm. wide or none at all. Californian, Argentinian and European seeds show all widths of wings. There are all variations in length of capsule in relation to length of calyx in all parts of the range, including Europe. There are also all types of habit throughout the range from very short, compact plants with fleshy leaves to large, heavy, long-stemmed plants, probably depending upon the ecological conditions of the habitat. A detailed study of more complete collections of European plants may throw some light upon these variations and bring out sound taxonomic differences, especially in size and length of capsule in relation to the calyx, type of wing and size of seed.

The Chilean plants often show low, elongate mounds upon the surface of the seed, unlike any European seeds I have been able to examine. However, at present I can find no other character to support a separation of Chilean plants. I admit that this plant seems common and widespread enough in Chile possibly to be native there. The Juan Fernandez material is not typical but its habit compares well with that from the Falkland Islands, which has typical seeds. Juan Fernandez seeds are small, 0.6–0.7 mm. long, with low, elongate

swellings and very delicate, vermiform traceries on the seed-coat. These seeds agree well with those of many Chilean specimens but are a bit smaller.

S. alata, according to Wiegand, differs from *S. marginata,* which is synonymous with *S. media,* in having more glabrous stems, more foliaceous bracts, and a more erose wing to the seed. Many European collections of *S. media,* however, are entirely glabrous and most have bracts as long as, or longer than, the type of *S. alata.* Except for the wide erose wing, this latter plant agrees in every way with many widely distributed collections of *S. media* from all parts of Europe. This type of wing, furthermore, is found in a few European plants and in some Californian collections.

12. S. MARINA (L.) Griseb. (PLATE 590, FIGS. 3a–3e, PLATES 591 and 592 and MAPS 7 and 8). Annual with 1–∞ diffuse stems from the base 5–35 cm. long: *internodes below the inflorescence* 4–30 mm. long, 0.6–2 mm. thick: *leaves not fascicled* or with 1 or 2 leaves in the axils, glabrous or glandular-pubescent, 5–40 mm. long, 0.6–1.5 mm. wide, bluntly mucronate; *stipules* deltoid, about as long as or sometimes a little longer than broad, 2–4 mm., usually 2.5–3 mm., long, apex not acuminate or only slightly so: *inflorescence a lax cyme,* sometimes very long, sometimes short; *internodes* glandular-pubescent or less often glabrous, the lowest 5–20 cm. long, 0.4–0.8 mm. thick: *bracts* foliaceous, the uppermost usually becoming minute, 3 mm. or less in length, or sometimes as much as 4–7 mm.[1]: *sepals* ovate, blunt-tipped, glabrous or glandular-pubescent, 2.4–5 mm. long; *petals* ovate, white, pink, or rosy, but often, when colored, white at the base, 1.6–4 mm. long, as much as 1–1.6 mm. shorter than the calyx; *stamens* 2–5; *styles* 3, separated to base, 0.4–0.6 mm. long: *mature capsules* 3.6–6.4 mm. long, equal to or as much as 2.2 mm. longer than the calyx: *fruiting pedicels* filiform, usually glandular-pubescent, sometimes glabrous, reflexed or not, the lowest 1–10 mm. long: *seeds light brown to deep reddish-brown, dull, smooth or slightly roughened by raised thickened places, but with no sculpture, glandular-papillate or not, papillae slender and small to thick and large, dark brown to white, all having dark brown, hard bases,* seeds usually 0.6–0.8 mm. long, only in rare cases as small as 0.5 or as large as 0.9 mm., usually not winged though occasionally with a white, usually erose wing which may be as broad as 0.4 mm.—Spicil. Fl. Rumel. et Bith. i. 213 (1843); Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 273 (1872), for the most part; Willk. & Lange, Fl. Hisp. iii. 165 (1880); Robins. & Fernald in Gray, Man. ed. 7, 378 (1908); J. K. Henry, Fl. So. Br. Columb. & Vanc. Is. 118 (1915), plants very likely *S. canadensis* var. *occidentalis.* *Arenaria rubra* β. *marina* L. Sp. Pl. i. 423 (1753);[2] also ed. 2; Torrey, Fl. N. & Mid. U. S. 456 (1824).

[1] See the discussion.

[2] Phrase-description is "Arenaria foliis linearibus longitudine intermediorum."

A. rubra β. L. Fl. Suec. ed. ii. 152 (1755).[1] *A. marina*[2] Allioni, Fl. Pedem. ii. 114 (1785); Roth, Fl. Germ. i. 189 (1788). *A. marina* (L.) Smith, Fl. Brit. ii. 480 (1800) and Eng. Bot. xiv. 958 & fig. (1802), probably a mixture of *S. marina* and *S. media*, the figure surely depicting *S. media;* Bigelow, Fl. Bost. ed. 3, 191 (1840), for the most part, excluding the synonym *Arenaria canadensis* Pers. *Stipularia marina* (L.) Haworth, Syn. Pl. Succ. 104 (1812). *Spergularia salina* J. & C. Presl, Fl. Čechica, 95 (1819); Gray, Man. ed. 5, 95 (1867); Robins. in Proc. Am. Acad. xxix. 311 (1894) and in Gray, Synop. Fl. i. 251 (1897); Chapman, Fl. So. U. S. ed. 3, 44 (1897); Fernald & Wiegand in Rhodora, xii. 162 (1910); Jepson, Fl. Calif. pt. v. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Rydberg, Fl. Prair. & Plains, 322 (1932); Munz, Fl. So. Calif. 164 (1935); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru pt. 2, no. 2, 632 (1937). *Lepigonum marinum* Wahlb. Fl. Gothob. 47 (1820), not as to plants discussed and references given which deal with *S. media;*[3] Kindberg, Synop. Lepig. 12 (1856), not as to description and literature cited which deal with *S. media.*[3] *L. marinum* (L.) Kindb. Mon. Lepig. 18, t. i, fig. 6 (1863), as to source of name but not as to description, excluding references, Griseb. and DC., all of which are *S. media*, and excluding *S. macrocarpa* and *S. rupestris*. *L. medium* sensu Wahlb. Fl. Gothob. 46 (1820), Linnaean authority for *media* not given but *A. rubra* β. *marina* L. given as a synonym, non *Arenaria media* L. (1762); sensu Koch, Syn. Fl. Germ. & Helv. ed. 2, i. 121 (1843), following Wahlb., non *Arenaria media* L. (1762). *L. medium* sensu Kindb. Synop. Lepig. 14 (1856), in part, at least as to the North American plants cited[4] and probably as to description, non *Arenaria media* L. (1762); sensu Kindb. Mon. Lepig. 24, t. ii, fig. 11 (1863), same treatment as in the Synop. Lepig., non *Arenaria media* L. (1762); sensu Wats. Smiths. Misc. Coll. no. 258 (Bibl. Index) 103 (1878), in small part, including those synonyms belonging with *S. marina*,[5] non *Arenaria media* L. (1762); sensu Brewer & Watson, Geol. Survey of California, Bot. i. 71 (1880), at least for the most part, non *Arenaria media* L. (1762). *Arenaria salina* (Presl) Seringe in DC. Prod. i. 401 (1824). *Spergula marina* Bartl. & Wendl. f. Beitr. Bot. ii. 64 (1825), probably as to plant but the authors refer to DC. "exclud. syn. Linn." *Alsine marina* (L.) Mert. & Koch in Roehl. Deutsch Fl. ii. 293 (1826);

[1] The same as Fl. Suec. ed. i. (1745). Phrase-description is "Arenaria foliis linearibus longitudine internodiorum" in both editions.

[2] No actual authority given for using *marina* but the Linnaean phrase for β. *marina* is used as a synonym; see discussion.

[3] Wahlberg here completely reverses the two Linnaean entities and is followed later by Kindberg in his Synopsis and also by Koch.

[4] *S. media* was probably not introduced or at least was not common in eastern North America at that time though I have seen none of the actual specimens cited. Also the capsule is said to be small which is not characteristic of *S. media*. Kindberg treats the large-capsuled *S. media* under *Lepigonum marinum* in the same work.

[5] Watson's treatment deals only with literature and includes synonyms belonging with many species, *e. g. S. marina, S. media* and *S. canadensis*.

Reichenb. Fl. Germ. 566 (1832); Webb & Berth. Phyt. Canar. i. 147 (1840), at least as to source of name but including many species such as *S. media, S. villosa,* etc. *Alsinella media* sensu Hornem. Nom. 32 (1827), who gives *Arenaria rubra marina* L. as the only synonym, non *Arenaria media* L. (1762). *Buda marina* (L.) Dumort. Fl. Belg. 110 (1827); Wats. & Coult. in Gray, Man. ed. 6, 89 (1889); Kuntze, Rev. Gen. iii, pt. 2, 13 (1898), at least as to source of name (*Moreno & Tonini* 343 is *S. ramosa,* and the synonyms *A. media* L. and *B. media* Dumort. belong with *S. media*); Macloskie, Report Princeton Univ. Exp. Patagonia, viii. i. pt. 5. 395 (1905), probably *S. media* as to plants. *Spergularia canadensis* sensu G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), in part, as to plants discussed because "plant pilose, rather hispid" and the southern part of range "Carolina" could apply only to *S. marina,* non *Arenaria canadensis* Pers. (1805). *Spergula rubra* β. Torr. & Gray, Fl. N. A. i. 175 (1838) (reference is made to *A. rubra* var. *marina* L.). *Lepigonum salinum* (Presl) Fries, Nov. Fl. Suec. Mant. 3, 34 (1839); Kindb. Synop. Lepig. 10 (1856); Kindb. Mon. Lepig. 36, t. iii, fig. 27 (1863), good figure and description; Smith, Eng. Bot. Suppl. v. 2978 (1864); Wats. in Smithson. Misc. Coll. no. 258 (Bibl. Index) 104 (1878). *Spergula salina* (Presl) D. Dietr. Syn. Pl. ii. 1598 (1840). *Alsine marina α minor* Heynh. Nom. 38 (1840), who gives *S. salina* Presl as synonymous. *Alsine heterosperma* Guss. Fl. Sic. i. 501 (1842) (gives *A. rubra* β. *marina* L. as a synonym). *Spergularia rubra* var. *marina* Gray, Man. 64 (1848), gives Linnaean authority for *rubra* but none for *marina.*[1] *Spergularia rubra* var. *marina* (L.) Gray, Man. ed. 2, 62 (1856), also Rev. Ed. and ed. 4, in part or possibly all as to plants discussed,[1] excluding the synonym *A. media* L. *Lepigonum neglectum* Kindb. Synop. Lepig. 6 (1856).[2] *L. salinum* * *Lepigonum canadense*[3] Kindb. Synop. Lepig. 11 (1856), as to plants described, probably. *L. leiospermum* Kindb. Mon. Lepig. 23, t. ii, fig. 10 (1863), excluding the synonyms *A. canadensis* Pers. and *A. media* Hooker f. and also the Falkland Island collection which is *S. media. L. rupestre* sensu Kindb. Mon. Lepig. 29, t. ii, fig. 13 (1863), in small part, including only the Montevideo (*Sello*) collections (see citations), excluding synonymy, citations, figure, and description, all of which apply to *S. rupicola* Lebel, non *Spergularia rupestris* Lebel (1848). *Spergula rubra* sensu Darby, Bot. So. States, 244 (1866) (*S. marina* because the stipules are described as ovate and plants as growing in salt marshes), non *Arenaria rubra* L. (1753). *Spergularia media* sensu Gray, Man. ed. 5. 95 (1867),

[1] Gray probably includes *S. canadensis* with *marina* because he says it is common on the seacoast and treats no other species besides *S. rubra.*

[2] Proved to be a synonym of *S. marina* because Kindberg, Mon. Lepig. 37 (1863), places *L. neglectum* as a synonym of *L. salinum* (Presl) Fries.

[3] Placed as a subordinate entity under *Lepigonum salinum,* obviously not in specific rank. Kindberg gives *Lepigonum canadense* Fisch. & Mey. Ind. Sem. Hort. Petrop. iii. 14 (1837), which is a *nomen nudum,* as to name and in no way refers to *Arenaria canadensis* Pers. (1805).

excluding reference *L. medium* Fries, non *Arenaria media* L. (1762); sensu Watson, Rep. King Exp. v. Bot. 42 (1871) (collection cited, *Watson* 177, is *S. marina*), non *Arenaria media* L. (1762). *S. miquelonensis* Lebel in Bull. Soc. Bot. France, xv. 58 (1868), *nomen nudum*.[1] *Spergula leiosperma* (Kindb.) F. Schmidt, Reisen Amurl. 131 (1868). *Spergularia heterosperma* (Guss.) Lebel, Mem. Soc. Sc. Nat. Cherb. xiv. 45 (1869); Heldr. ex Nym. Conspect. 122 (1878–1882). *S. neglecta* Syme, Engl. Bot. ed. 3, ii. 129, t. 255 (1873). *S. rubra* sensu Chapman, Fl. So. U. S. ed. 2, 48 (1884), non *Arenaria rubra* L. (1753). *Tissa marina* (L.) Britton in Bull. Torr. Bot. Club, xvi. 126 (1889); Greene, Fl. Francisc. 128 (1891), as to source of name but not as to description, because he states that the capsule is twice the length of the calyx and because he applies the name *T. salina* to what should be *S. marina* (Greene was probably describing *S. media*); Greene, Man. Bot. San Francisc. Bay 37 (1894), not as to description for same reasons as above; Britt. & Brown, Ill. Fl. U. S. ii. 37, fig. 1514 (1897); Small, Fl. Se. U. S. 418 (1903); Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 263 (1906) (most and probably all the plants cited are *S. canadensis* var. *occidentalis*); Piper & Beattie, Fl. Nw. Coast, 145 (1915); Small, Man. Se. Fl. 502 (1933). *Tissa salina* (Presl) Britt. in Bull. Torr. Bot. Club, xvi. 127 (1889), as to source of name but not as to description which is that of *S. canadensis;* Greene, Fl. Francisc. 128 (1891) and Man. Bot. San Francisc. Bay, 37 (1894); Jepson, Fl. W. Mid. Calif. 170 (1901); Howell, Fl. Nw. Coast, 88 (1903); Heller, Muhlenbergia, vi. 96 (1910); Rydb. Fl. Rocky Mts. ed. 1, 279 (1917), also ed. 2; Tidestrom, Contrib. U. S. Nat. Herb. xxv. (Fl. Utah & Nevada) 197 (1925). *Tissa tenuis* sensu Greene in Bull. Torr. Bot. Club, xvi. 128 (1889), including collections *Rothrock* 154 and Santa Monica, *J. C. Nevin*, and excluding Alameda, *Greene* collection, which is *S. marina* var. *tenuis*, non *Lepigonum tenue* Greene (1887). *T. diandra* sensu Brandegee, Proc. Calif. Acad. Ser. 2, ii. 131 (1889), because collection cited is of *S. marina*, non *Arenaria diandra* Guss. (1827). *Buda marina* (*?*) var. *minor* Wat. & Coult. in Gray, Man. ed. 6, 90 (1889).[2] *Buda marina* var. *leiosperma* N. E. Brown apud Wats. & Coult. in Gray, Man. ed. 6, 90 (1889).[3] *Corion marinum* (L.) N. E. Brown in Syme, Engl. Bot. ed. 3, Suppl. 48 (1891). *Corion marinum* var. *leiosperma* (Kindb.) N. E. Brown[3] in Syme, Eng. Bot. ed. 3, Suppl. 48 (1891). *Tissa salina* var. *sordida* Greene, Fl.

[1] Lebel's combination is based upon an herbarium name, *Arenaria miclonensis* LaPylaie (B.), whose specimen is *S. marina*. Also, Kindberg mentioned this latter name among the "nomina inedita" omitted from the synonymy of his *L. salinum*, Mon. Lepig. 37 (note) (1863).

[2] I have never been able to find the Star Island plant collected by Sereno Watson, but I believe that it would be a puny specimen of *S. marina*.

[3] N. E. Brown sent a proof to the Gray Herbarium in which was a description of *Buda marina* var. *leiosperma*. Watson published this in 1889, with no reference to Kindberg, before N. E. Brown's work actually was completed. Brown finally published it as *Corion* (instead of *Buda*) *marinum* var. *leiosperma* in 1891.

Francisc. 129 (1891) and Man. Bot. San Francisc. Bay 37 (1894). *T. salina* var. *Sanfordii* Greene, Fl. Francisc. 129 (1891) and Man. Bot. San Francisc. Bay 37 (1894). *Spergularia salina* var. ? *minor* Robins. in Proc. Am. Acad. xxix. 312 (1894) and in Gray, Synop. Fl. i. 252 (1897). *Tissa sparsiflora* Greene in Erythea, iii. 46 (1895); Rydberg, Fl. Rocky Mts. ed. 1, 279 (1917), also ed. 2. *Spergularia salina* var. *leiosperma* (Kindb.) Gürke, Pl. Eur. ii. 196 (1897). *Tissa diandra bracteata* sensu Piper, Contrib. U. S. Nat. Herb. xi. (Fl. State Wash.) 264 (1906), in part, including only the collection, *Sandberg and Leiberg* 346, non *Spergularia salsuginea* var. *bracteata* Robins. (1897). *Spergularia sparsiflora* (Greene) A. Nels. in Coulter & Nels. New Man. Centr. Rocky Mts. 187 (1909). *S. leiosperma* (Kindb.) Fernald & Wiegand in Rhodora xii. 162 (1910). *Tissa leiosperma* (Kindb.) Heller, Muhlenbergia, vi. 84 (1910). *Spergularia salina* var. *sordida* (Greene) Jepson, Fl. Calif. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923). *Alsine sparsiflora* (Greene) House in Am. Midl. Nat. vii. 134 (1921). *A. maritima* House in Am. Midl. Nat. vii. 133 (1921).[1]—North America and South America (where it is probably introduced); common along temperate seashores of the Atlantic coast from Quebec to Florida and of the Pacific coast from British Columbia to Lower California and in alkaline places in the interior of the continent.

The following citations are of plants with papillose seeds (see map 7).

Quebec: brackish marshes, Cacouna, Temiscouata Co., *Fernald*, August 8, 1902 (G., B.); salt marsh, Bic, River St. Lawrence, Rimouski Co., *Fernald & Collins* 1031, July 25 and 26, 1907 (G., U. S.). Prince Edward Island: damp brackish sand, Alberton, Prince Co., *Fernald & St. John* 7435, July 11, 1912 (G., U. S., Can., inflorescence leafy). New Brunswick: "La Prée," Memramcook, Westmoreland Co., *Victorin*, August 21, 1919 (G., U. S.); salt marsh 4 miles ne. of Sussex, Kings Co., *Svenson & Fassett* 1095, August 22, 1923 (G.); dry headlands, Grande Anse, Gloucester Co., *Blake* 5527, August 22, 1913 (G.), very small seeds 0.5–0.6 mm. long. Nova Scotia: salt marsh at head of Baddeck Bay, Victoria Co., *Fernald & Long* 21183, August 27, 1920 (G., U. S.); red sandstone alluvium near the brackish mouth of Salmon River, Truro, Colchester Co., *Fernald & Wiegand* 3327, September 11, 1910 (G.). Maine: old wharf, Pembroke, Washington Co., *Fernald* 1761, July 29, 1909 (G.); site of old pickle factory, North Berwick, York Co., *Fernald*, September 26, 1897 (G., N. E. B. C.). New Hampshire: Seabrook, Rockingham Co., *A. A. Eaton*, July 6, 1903 (G.). Massachusetts: Revere, Suffolk Co., *C. E. Faxon* (G.); salt marsh bordering Bass River, Yarmouth, Barnstable Co., *Fernald & Long*, Plant. Exsicc. Gray. 357, August 16,

[1] House bases this combination upon *Arenaria maritima* Pallas, Reise iii. 603 (1772–73), which is a *nomen nudum* and cited by index Kewensis as *Arenaria marina* Pallas.

1919 (G., D. S., U. C., Pom., inflorescence leafy). Rhode Island: Wickford, *Kennedy*, June 17, 1908 (G.). Connecticut: Groton, *Jansson*, August 3, 1927 (W.). New York: Northbeach, Long Island, *Heuser*, June 22, 1895 (B.); saline clay about the salt sheds, south of Liverpool, Syracuse, Onondaga Co., *Fernald, Wiegand & Eames* 14277, August 31, 1922 (G.). New Jersey: Weehawken, Hudson Co., *Van Sickle*, July 12, 1893 (U. S., inflorescence leafy); brackish marsh, e. of Sea Breeze, Cumberland Co., *Fogg* 8798, June 21, 1935 (Penn.). Delaware: tidal mud, Bakeoven Point, Kent Co., *Larson* 963, July 8, 1935 (Penn.); marshy land, 2 miles nw. of Woodland Beach, Kent Co., *Larsen* 532, June 21, 1934 (Penn.). Maryland: Chesapeake Beach, Calvert Co., *House* 1453, August 20, 1905 (U. S.). Virginia: sand at upper border of salt marsh, Wachapreague, Accomac Co., *Fernald & Long* 3926, July 26, 1934 (G.); shell heap, edge of tidal marsh, York River, n. of Williamsburg, James City Co., *Grimes* 4012, July 15, 1921 (G.); Virginia, *Clayton* 475, British Museum—photo. in G., our plate 592—marked "*Arenaria foliis linearibus longitudine internodiorum.* Hort. Cliff. p. 173", cited by Linnaeus, Sp. Pl. i. 423 (1753). North Carolina: Acracoke Island, Hyde Co., *Kearney* 2302, October 13, 1898 (U. S.). Florida: shore of St. John's River, Duval Co., *Fredholm* 5311, June 14, 1902 (U. S., seeds unusually small, 0.5–0.6 mm. long); low places subject to tidal inundation, North Beach, St. Augustine, St. John Co., *Donnell Smith*, March 21, 1884 (U. S., very small, nearly smooth seeds 0.5–0.6 mm. long). Bermuda: Spittal Pond, *R. B. Kennedy* 171, April 5, 1929 (G.); salt marsh near Spittal Pond, *Stewardson Brown* 591, February 10–March 9, 1908 (G.). Illinois: waste ground in city of Chicago, Cook Co., *Moffat* 283, August 12, 1893 (W.). Athabasca: Mackenzie Basin: near Heart (Raup) Lake, Wood Buffalo Park, about 59° 41′ N., 111° 56′ W., prairie along small salt creek, *Raup* 2343, August 20, 1928 (Can.) and salt plain, 2342, August 19, 1928 (Can.); Little Buffalo River, Wood Buffalo Park, *Russell*, July 31, 1926 (Can.). Idaho: Alpine Hot Springs, Bonneville Co. (on the Snake River, near the Wyoming Boundary), *Payson & Armstrong* 3432, July 9, 1923 (G., Pom., inflorescence leafy). Texas: Sabine Pass, Jefferson Co., *Reverchon* 3694, April 25, 1903 (G., U. S.). New Mexico: Bernalillo, Sandoval Co., 1555 m., *Arsène & Benedict* 15653, July 12, 1926 (U. S.). Baja California: springy slope, trail to cypress grove, Guadalupe Island, *J. T. Howell* 8287, March 17, 1932 (Cal. Acad., U. C., D. S.); Poso Grande, Southern District, *Brandegee*, March, 1889 (G.); San Carlos, Northern District, *Eastwood* 12409, September 10, 1923 (Cal. Acad.). California: near R. R. track, Linda Vista, San Diego Co., *Macbride & Payson* 783, July 6, 1915 (G.); waste water sink, West Riverside, Riverside Co., *F. M. Reed* 1131, July 8, 1906 (U. S., D. S.); ½ mile s. of Lake Elsinore, desiccating mud-flat, Riverside Co., *Munz* 5074, April 29, 1922 (Pom.); stream-bank, Aliso Canyon, Laguna Beach region, Orange Co., *D. L. Crawford*, July 26, 1916 (Pom.); Montebello,

Los Angeles Co., *Cecil Hart*, March 22, 1927 (Cal. Acad.); border of rainpool on alkaline flats 5.5 mi. north of Lancaster, Mojave Desert, Los Angeles Co., *J. T. Howell* 4896, May 12, 1930 (Cal. Acad.); coast highway near Pt. Mugu, Ventura Co., *Abrams* 13691, June 26, 1935 (D. S., both smooth- and papillose-seeded plants on same sheet); along beach, Ventura, Ventura Co., *Eastwood* 5026, April 17, 1916 (Cal. Acad.); sandy flat on shore, Dix Cañon, Santa Cruz Island, Santa Barbara Co., *Clokey* 5150, May 26, 1930 (G.); La Graciosa, Santa Barbara Co., *Eastwood* 858, July 2, 1906 (G.); Santa Barbara, *Rothrock* 154, July, 1875 (G.); Piedras Blancas, San Luis Obispo Co., *Eastwood & Howell* 5987, June 15, 1938 (Cal. Acad.); Hollister, San Benito Co., *Setchell*, April 14, 1897 (U. C.); near Hollister, San Benito Co., *Eastwood & Howell* 4298, May 4, 1937 (Cal. Acad.); colonies in low alkaline spots, Searsville, San Mateo Co., *C. F. Baker* 1859, October 20, 1920 (G., U. S., Cal. Acad., U. C., Pom., determined as *Tissa sordida* by E. L. Greene); near Alameda, Alameda Co., *Greene*, July 31, 1887 (G., specimen only fragmentary but characteristic of *S. marina*, marked *T. sordida* Greene); at Alameda, Alameda Co., *Greene*, July 21, 1887 (U. C.); eastern Livermore Valley, Alameda Co., *J. T. Howell* 13742, April 10, 1938 (Cal. Acad.); colonies occasional on the alkaline plains, Byron, Contra Costa Co., *C. F. Baker* 2865, April 27, 1903 (G., U. S., Notre Dame, U. C., Pom., determined as *Tissa Sanfordii* by E. L. Greene); wet soil of low field at Holt, San Joaquin Co., *J. T. Howell* 10792, September 2, 1932 (Pom.); Calistoga Hot Springs, Napa Valley, *J. P. Tracy* 1858, May 18, 1903 (U. C.); growing alone on muddy banks, Drake's Estero, 8 miles west of Inverness, Marin Co., *G. B. & R. P. Rossbach* 629, May 26, 1938 (G., D. S.); salt marsh at base of sand dunes, Bodega Bay, Sonoma Co., *G. B. & R. P. Rossbach* 630, May 27, 1938 (G., D. S.); 12 miles n. of Dixon, Yolo Co., *Doris K. Kildale* 5033, May 8, 1928 (D. S.); gray clay, alkaline soil, near Colusa, in the valley oak belt, Colusa Co., *Heller* 13541, April 10, 1921 (U. S., D. S.); in wet irrigation ditch, 3 miles e. of Williams, Colusa Co., *G. B. & R. P. Rossbach* 632, May 21, 1938 (G., D. S.). Oregon: on ballast, Lower Albina, Portland, Multnomah Co., *Sheldon* S.9909, July 20, 1902 (Ore.). Washington: salt marsh, Port Hadlock, Jefferson Co., *G. N. Jones* 3100, June, 1931 (W.). Brazil: in den Salinen bei lago Friv. (Lake Feia?), Rio de Janeiro, *Ule* 4699, October 19, 1899 [B.]; *Sello* d2381 (d2167–2438 ebenda S. Francisco do Paula und Villa Rio Grande do Sul, October, November, 1824)[1] (B., one sheet marked *Lepigonum neglectum* Kindb. 1861).[2] Port Alegre, Prov. Rio Grande do Sul, *Tweedie* (K.). Brazil, no locality: *Sello*, (Leiden). Uruguay: Montevideo, *Sello* d208 (B., 4 sheets, one marked "*Spergularia salina* Presl quoad planta Selloana det. P. Rohrbach" and *Lepigonum rupestre* (Lebel) Kindb. 1861. Montevideo, *Sello* d207 (B., marked *Lepigonum neglectum*

[1] Urban in Engler, Bot. Jahr. xvii. 196 (1893).
[2] Cited by Kindb. under *L. salinum*, Mon. Lepig. 38 (1863).

Kindb. 1861);[1] Montevideo, *Gibert* 170, 989 (K.); in dry sand, Curarein, *Berro* 2556, September 24, 1902 (K.); Pocitos-Malvin, Montevideo, *Herter* 76201, November, 1924 (B.). Argentina: Prov. Buenos Aires: in suelo anegadiso cerca del rio de la Plata, Isla Mariel, *Burkart* 3044, December 6, 1928 (B.); wet saline places, Bañado de Flores, Buenos Aires, *Parodi* 5934, November 16, 1924 (B.). Prov. Jujuy: El Volcan, *Hieronymus & Lorentz* 731 & 735, May 12 and 13, 1873 (B.). Prov. Santa Cruz: Puerto San Julian, *M. E. Blake* 192, April, 1933 (K.).

The following citations are of plants with smooth seeds (see map 8).

Ile Miquelon: maritime shores, bord du Grand Étang, *Arsène* 253, August 16, 1900 (G.). Quebec: damp hollows, gravelly beach, Carleton Point, Carleton, Bonaventure Co., *Collins & Fernald*, July 21, 1904 (G.). Magdalen Islands: damp, brackish, sandy beach, Grande Entreé, Coffin Island, *Fernald, Long & St. John* 7427, August 19, 1912 (G., U. S., Can., U. C.). Prince Edward Island: border of salt marsh, Bunbury, Queens Co., *Fernald, Long & St. John* 7426, August 28, 1912 (G., Can.). New Brunswick: shore, Shippigan, Lameque, Gloucester Co., *Blake* 5538A, August 26, 1913 (G.); marsh, Richibucto, Kent Co., *Blake* 5712, September 22, 1913 (G.); St. Andrews, Charlotte Co., *Fowler*, July 28, 1900 (U. S.). Nova Scotia: brackish beach of Wallace Lake, Sable Island, *H. St. John* 1222, August 14, 1913 (G., Can., U. S.); brackish gravelly beach by Baddeck Bay, Baddeck, Victoria Co., *Fernald & Long* 21187, August 27, 1920 (G., Can.); upper border of gravelly strand, Villagedale, Shelburne Co., *Fernald, Long & Linder* 21184, August, 1920 (G., Can.); waste places and roadsides, Windsor, Hants Co., *Fernald, Bartram & Long* 23831, July 25, 1921 (G., Can.). Maine: dryish strand, eastern side of Moose Island, Passamaquoddy Bay, Washington Co., *Fernald* 2216, August 16, 1909 (G., Cal. Acad.); shores of Pool, Great Cranberry Isle, Hancock Co., *Rand & Redfield*, August 30, 1892 (Penn.); on small barrier beach sw. shore of Warren Island, Islesboro, Waldo Co., *R. P. & G. B. Rossbach*, September 4, 1935 (G.). New Hampshire: Star Island, Isles of Shoals, Rockingham Co., *E. F. Williams*, September 19, 1901 (G.); Little Harbor, Rye, Rockingham Co., *E. F. Williams*, September 19, 1901 (G.). Massachusetts: salt marsh, Newbury, Essex Co., *E. F. Williams*, July 31, 1898 (G.); Woods Hole, Barnstable Co., *Pennell* 3338, July 26, 1911 (Penn.). Rhode Island: salt marshes about Harbor Pond and Tim's Pond, Block Island, Newport Co., *Fernald & Long* 9477, August 19, 1913 (G.). Connecticut: sandy bank of Housatonic River, Milford, New Haven Co., *E. H. Eames*, August 15, 1895 (U. S.); brackish shore, flowers white, Norwalk, Fairfield Co., *E. H. Eames* 9732, July 24, 1921 (G.). New York: sandy beach, Fisher's Island, Suffolk Co., *H. St. John* 2719, August 10–15, 1920 (G.); salt marshes, Wading River

[1] Cited by Kindb. under *L. rupestre*, Mon. Lepig. 29 (1863).

Northville, Suffolk Co., Long Island, *H. W. Young*, August 12, 1873 (U. S.). New Jersey: sand over brackish marsh, Brigantine Beach, Atlantic Co., *Fogg* 9544, August 26, 1935 (Penn.); brackish marsh near West Creek, se. of Delmont, Cumberland Co., *Fogg* 5619, June 22, 1933 (Penn., two sheets very different in habit); Port Norris, *J. H. Holmes*, September, 1898 (Pom.). Delaware: sandy beach, 1 mile so. of Bower's Beach, Kent Co., *Larsen* 918, July 24, 1935 (Penn., bracts of inflorescence very small). Carolina: no definite locality, ad littora maris, *Beyrich* (B., marked *L. leiospermum* Kindb. 1861).[1] Alabama: ballast banks, Mobile River, *Mohr*, May, 1883 (U. S.). North Dakota: w. of Cushion Slough, Kenmore, Ward Co., *F. P. Metcalf* 583, October 3, 1917 (U. S.); Eckelson Lake, Sanborn, Barnes Co., *D. C. Mabbott* 291, August 8, 1917 (U. S.). Texas: Virginia Point, *W. L. Bray* 35, April 15, 1899 (U. S.); near San Elizario (fide added note on U. S. sheet), El Paso Co., *C. Wright* 1324, 1852 (G., U. S.). Alberta: garden patch, Garden Plains, Red Deer Co., *Brinkman* 2767, June 29, 1927 (U. S.). Saskatchewan: 15 miles w. of Saskatoon, Saskatoon Co., *Macoun & Herriot* 70906, July 29, 1906 (G., Can., Pom.); Saskatchewan Plains, *Macoun*, Bot. Railr. Surv. 287, August 19, 1872 (G.); salt marshes west of Long Lake, *Macoun* 2674, July 10, 1879 (Can.). Montana: dried encrusted shore of an alkaline lake, Lake Bowdoin, e. of Malta, Phillips Co., *G. B. & R. P. Rossbach* 308, July 6, 1936 (G., D. S., U. S.). Wyoming: Laramie, Albany Co., *A. Nelson* 1868, September 3, 1895 (G., U. S., U. C., Pom.); Seven Mile Lake, Albany Co., *A. Nelson* 1158, October 15, 1894 (G., U. S., Notre Dame, type collection of *Tissa sparsiflora* Greene). Colorado: New Windsor, Weld Co., *Osterhout* 2347, August 8, 1901 (U. S., U. C.), July, 1896 (G.), September 19, 1900 (Pom.), July 7, 1907 (D. S.). Utah: 6000 ft. alt., Wahsatch, *Watson* (King Exped.) 177, 1869 (U. S., G.); in wet places, Kelton, Box Elder Co., *Garrett* 5414, August 15, 1929 (D. S.); alt. 4300 ft., Salt Lake City, Salt Lake Co., *M. E. Jones* 1088, July 26, 1879 (B., U. S., U. C., Pom.). Nevada: se. of Reno, Washoe Co., *F. H. Hillman* July 20, 1894 (Pom.); caked alkali ground, St. Thomas, Muddy R., Clark Co., *Goodding* 696, May 3, 1902 (G., U. S.). Arizona: Tucson, Pima Co., *Toumey*, May 30, 1894 (N. Y., U. C.); Sacaton, Pinal Co., *Peebles* 1265, March 23, 1926 (U. S.); Agua Caliente, Maricopa Co., *J. I. Carlson*, March 19, 1914 (Cal. Acad.). New Mexico: Albuquerque, Sandoval Co., *M. E. Jones*, July, 1884 (Pom.). Lower California: San Vincente, Northern District, *Brandegee*, June 1, 1893 (U. C.). California: Carisso Creek (this creek just sw. of the Salton Sea in both San Diego and Imperial Cos.) Colorado Desert, *Brandegee*, March 26, 1901 (U. C.); semi-alkaline spot, Garlic Springs, Mohave Desert, San Bernardino Co., *Munz & Keck* 7935, April 10, 1924 (G., Pom.); dry mud flat, s. of Lake Elsinore, Riverside Co., *Munz* 5070, April 29, 1922 (Pom.); Balboa, Orange Co., *Abrams* 6565,

[1] Cited under *Lepigonum leiospermum* Kindb. Mon. Lepig. 24 (1863).

June 23, 1917 (D. S.); low brackish flat near coast, Redondo, Los Angeles Co., *Braunton* 308, May 25, 1902 (U: S., D. S.); Santa Monica, Los Angeles Co., *J. C. Nevin* 647, 1881 (G.,[1] D. S.);[2] coast highway near Pt. Mugu, Ventura Co., *Abrams* 13691, June 26, 1935 (Pom., one plant with papillose seeds and two with smooth seeds; see also citation under papillose seeds); Santa Barbara, Santa Barbara Co., *Rothrock* 154, July, 1875 (G.);[1] margin of Soda Lake, Carisso Plain, San Luis Obispo Co., *Ferris & Rossbach* 9467, May 12, 1938 (G., D. S.); alkaline flats ½ mile from Earlimart, near U. S. Highway no. 99, Tulare Co., *Ferris & Rossbach* 9669, May 21, 1938 (D. S.); Mercey Hot Springs, Fresno Co., *Eastwood & Howell* 5206, April 20, 1938 (Cal. Acad.); Salinas River, Neponset, Monterey Co., *Abrams* 4029, September 29, 1903 (D. S.); Carmel River, Monterey Co., *Mrs. Joseph Clements*, August 15, 1910 (Pom.); Oakland, Alameda Co., *Wm. Holder*, State Survey 2578 (U. C.); Livermore Pass, Mt. Diablo region, Alameda Co., *Burtt Davy*, May, 1898 (U. C., Pom.); on mucky flats subject to overflow, Stone Lagoon, Humboldt Co., *J. P. Tracy* 5865, August 7, 1921 (U. C.). Oregon: Marshfield, Coos Co., *Walton Haydon* 527, 1914 (Cal. Acad.); salt marsh on tide flats, Toledo, Lincoln Co., *J. C. Nelson* 2355, July 5, 1918 (G.); salt marshes, Tillamook, Tillamook Co., *T. J. Howell*, July, 1882 (B., U. C., Ore.); muddy banks bordering salt marsh at Bay City, 7 miles n. of Tillamook, Tillamook Co., *G. B. & R. P. Rossbach* 627, June 22, 1938 (D. S., G.); Hot Lake, Union Co., *Piper* 5198, June 22, 1921 (U. S.). Washington: North Head, *E. A. McGregor*, August 13, 1907 (D. S.); near Egbert Spring, Douglas Co., *Sandberg & Leiberg* 346, July 1, 1893 (G., U. S., B., Cal. Acad., U. C., Ore.); in pasture on Johnson Creek, Hudson's place, north of Omak, Okanogan Co., *C. B. Fiker* 1155, September 1, 1932 (D. S.); tide land, Marysville, Snohomish Co., *J. M. Grant*, July, 1927 (Pom.), June, 1920 (D. S.). British Columbia: shores of alkaline lakes, Kamloops, *Macoun* 2673, June 13, 1889 (Can.); vicinity of Sidney, Vancouver Island, *Macoun* 86988 (Can.); in a salt marsh at Sidney, Vancouver Is., *Macoun* 78519, July 28, 1908 (Can.).

The following citations are of plants with a few papillae on the rim at the summit of the seed.

Prince Edward Island: Charlottetown, Queens Co., *Fernald & St. John* 210, August 13, 1914 (U. S., G., Cal. Acad., D. S., U. C., W.); Summerside, Prince Co., *Churchill*, July 21, 1901 (G.). New Brunswick: Tracadie, Gloucester Co., *Blake* 5648, September 10, 1913 (G.); beach, Portage Island, Northumberland Co., *Blake* 5681, September 17, 1913 (U. S., G.); Shediac Island, Westmoreland Co., *F. T. Hubbard*, August 5, 1914 (G.). Nova Scotia: Cape Breton Island, *Macoun* 19033, August 19, 1898 (G.); Canso, Guysborough Co., *Fowler*,

[1] Marked *S. tenuis* Robinson, Syn. Fl. N. Amer.

[2] Cited under *Tissa tenuis* Greene ex Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889).

August 6, 1901 (U. S.). MAINE: Warren Is., Islesboro, Waldo Co., *G. B. & R. P. Rossbach*, September 4, 1935 (G.). MASSACHUSETTS: Harwich, Barnstable Co., *Fernald* 16783, July 13, 1918 (U. S.); shore of Great Tisbury Pond, Chilmark, Martha's Vineyard, *F. C. Seymour* 1199, July 25, 1916 (U. S.). RHODE ISLAND: Westerly, Washington Co., *Woodward*, August 4, 1917 (G.). NORTH CAROLINA: Bettie, Carteret Co., *L. F. & F. R. Randolph* 816, July 17, 1922 (G.). TEXAS: Morgan's Point, Harris Co., *E. J. Palmer* 11959, May 20, 1917 (U. S., U. C.); Port Arthur (McFadden Ranch), Jefferson Co., *Martin & Warren*, May 9, 1930 (U. S.). WASHINGTON: vicinity of Port Townsend, Jefferson Co., *M. A. Barber* 156, August 12, 1899 (G.); Straits of De Fuca, nw. coast of America, *W. Arnott* 3 (B., marked *Lepigonum neglectum* Kindb. 1861).

Plants belonging to *S. marina* may be either smooth- or papillose-seeded. At first thought one would feel that plants with such different seeds should not be included in the same entity. However, measurements of lengths of capsules, sepals, petals, stipules, etc. of smooth-seeded plants do not differ from those of papillose-seeded plants. Furthermore, the seed-size and -surface are the same, the only difference being the presence or absence of glandular papillae. Indeed occasional plants have a few scattered papillae upon the rim of the seed or only one or two upon the whole seed (see citations). One may not worry about the fact that the seeds may be of these two types, for many other species are similar in this respect, *e. g. S. villosa*, *S. platensis*, *S. canadensis*, *S. ramosa*, *S. fasciculata*, *S. pycnantha*, and *S. diandra*. Further to clinch this decision, the distribution of plants with smooth seeds practically coincides with that of plants with papillose seeds (see MAPS 7 and 8). It is true that papillose-seeded plants have not been collected as often in the interior of the country; but the fact remains that there, few collections even of smooth-seeded plants have been made. It has not been proved that there papillose-seeded plants are not as widespread as smooth-seeded ones.

In smooth-seeded plants on the east coast, Profs. Fernald and Wiegand[1] have noted that the bracts at the uppermost nodes are more conspicuous than in the papillose-seeded ones. It is true that on the east coast the majority of the papillose-seeded plants have bracts at the upper nodes measuring only 1.5–2.5 mm. long, while those of smooth-seeded plants measure 3–7 mm., always using most mature plants. Exceptions in the same region may be found, however, showing papillose-seeded plants with long bracts and smooth-seeded ones

[1] RHODORA, xii. 157 (1910).

with short bracts. In studying this same problem on the west coast, the vast majority of mature individuals of smooth- and papillose-seeded plants have been found to have the uppermost bracts 3 mm. or less in length and only rarely does one find longer bracts, which then occur in both kinds of plants.[1] With all this evidence in favor of the unity of both kinds of plants, the separate species *S. leiosperma*, taken up by Fernald and Wiegand,[2] is not tenable. Because of the fact that the character of the upper part of the inflorescence being leafy does not hold over a great part of the range, and never does mark a sharp division between the two kinds of plants, *S. leiosperma* is not tenable, even as a variety.

Linnaeus under β. *marina* of 6. *Arenaria rubra* in Sp. Pl. i. 423 (1753) gives the following:

β. Arenaria foliis linearibus longitudine intermediorum marina.
Hort. cliff. 173. *Gron. virg.* 161. *Roy. lugdb.* 451.
Spergula marina nostras. *Raj. hist.* 1034.
Alsine spergulae facie media. *Bauh. pin.* 251.
Habitat α *in* Europae *arenosis collibus*, β. *in litoribus marinis.* ⊙
Stamina in campestri certe 10, *sunt; in maritima prope Aboam stamina tantum 5 observavit D. Kalm.*

The Linnaean herbarium has the type of *Arenaria rubra* L. but nothing marked β. *marina* or bearing the Linnean phrase-name, above quoted, describing β. *marina*, or bearing any of the synonymous phrase-names occurring in the quotation above.

Linnaeus, Hort. Cliff. 173 (1737), gives, "3. Arenaria foliis linearibus longitudine internodiorum."[3] The Clifford herbarium contains three specimens filed under "Arenaria foliis longitudine internodiorum"[4] but none of them have this phrase on the sheet. One of these sheets bears the number 6 and the phrase, "Alsine spergulae, facie media" and, in a different hand, "Spergula saginoides."[5] *Alsine spergulae facie media* C. Bauhin, Pinax, 251, occurs as a synonym of *Arenaria foliis linearibus longitudine internodiorum* in Hort. Cliff.

[1] A collection made by Prof. L. R. Abrams 13691, at Mugu Pt., Ventura Co., California (see citations), shows plants with smooth seeds snd others with papillose seeds but otherwise with no difference whatever, the bracts even being identical. These seed-differences were checked by using seeds from within the capsules.

[2] Rhodora, xii. 157 (1910).

[3] "Intermediorum" of Sp. Pl. (1753) is a *lapsus calami*, corrected in ed. 2.

[4] I understand that the Clifford herbarium, as well as the Linnaean herbarium, is arranged in the order of the book. These sheets bear in the lower left corner in pencil, "p. 173 *Arenaria*. 3" which corresponds to the page-number and species-number under *Arenaria* in Hort. Cliff.

[5] In the herbarium of Clifford in the British Museum, photograph in Gray Herbarium. Data from these sheets by courtesy of Mr. C. A. Weatherby.

and in Sp. Pl. Therefore this plant, bearing Bauhin's phrase-name was probably part of the basis of *Arenaria foliis* etc. of Linnaeus. The Clifford specimen is in good condition, with mature capsules and papillose seeds, and corresponds in habit and all measurements with the species under discussion.

Another sheet has the number 7 and the inscription, "Alsine (folio flore subcaeruleo, [crossed out]), spergulae facie minor" and in a different hand "Arenaria rubra."[1] This phrase is very similar to that under *Arenaria rubra* α. *campestris*, L.[2] namely, "Alsine, spergulae facie, minor s. Spergula minor, subcaeruleo flore." The plant is immature, but resembles that upon the sheet last discussed which probably belongs to β. *marina* of Linnaeus. One cannot be sure, then, whether this plant is the type of α. *campestris* L.[3] or was considered as belonging to the *marina* phrase-name by Linnaeus but never relabeled as such. At least it cannot be considered the type of *Arenaria rubra*, β. *marina* L.

The third sheet has the label, "Alsine montana capillaceo folio. C. B. p. 251. Spergula dicta major. Spergula facie minor. Spergula minor flosculis sub . . . [word illegible] C. B."[4] The plant is *Scleranthus annuus* fide Mr. C. A. Weatherby. Since these citations do not appear in the synonymy of *Arenaria rubra* in Sp. Pl. or in any of the references given there and since the plant is not even a *Spergularia*, this cannot be the type of Linnaeus' β. *marina*.

Therefore, of these three sheets only one, *namely that with no. 6 and the inscription "Alsine spergulae facie media" can be the type of Arenaria rubra* β. *marina L., since Linnaeus gives "Alsine spergulae facie media" as synonymous with Arenaria rubra* β. *marina in Sp. Pl. and with "Arenaria foliis linearibus longitudine internodiorum" in Hort. Cliff.*

Further to solidify the basis for the retention of the name *marina*, *Clayton* 475, cited by Gronovius, Fl. Virg. 161 (1739) may be considered.[5] The reader will recall that this reference was given by Linnaeus under *Arenaria rubra* β. *marina*. *Clayton* 475 bears the

[1] In the herbarium of Clifford in the British Museum, photograph in Gray Herbarium. Data from these sheets by courtesy of Mr. C. A. Weatherby.

[2] Sp. Pl. i. 423 (1753).

[3] *Arenaria rubra* α. *campestris* Linn. Sp. Pl. i. 423 (1753) is certainly a mystery. Whether Linnaeus meant it to be a separate variety under *A. rubra* or merely that part of *rubra* not belonging to β. *marina* and therefore synonymous with *A. rubra*, I do not know. This is the only specimen I have been able to locate which is at all traceable to α. *campestris*.

[4] This corresponds to III under *Alsine alpina* in C. Bauhin, Pinax, 251 (1623).

[5] In the British Museum—photograph in Gray Herbarium.

phrase-name "Arenaria foliis linearibus longitudine internodiorum, Hort. Cliff. p. 173", which is cited by Gronovius in his Flora Virginica. The specimen is mature and bears papillose seeds like those of the plants cited for *S. marina* in this monograph and like those of the type of *Arenaria rubra* β. *marina* L.

With actual specimens known as the basis for *Arenaria rubra* β. *marina* L., all that remains is to confirm the first use of the epithet in the specific rank. This is *Arenaria marina* All. Fl. Pedem. ii. 114 (1785).[1] Allioni gives no direct authority for the epithet, but he does give the Linnaean phrase-name and cites Gouan, Fl. Monspel. 242 (1765). Although Gouan at this place uses the Linnaean names (*A. rubra*, α. *campestris* and β. *marina*), he does not refer to Linnaeus. He does, however, cite his own Hortus Monspeliensis, 218 (1762), where reference is made to the Species Plantarum and the Linnaean phrase-name is quoted under the second variety (*marina*). The origin of Allioni's epithet may thus be traced pretty clearly to Linnaeus.[2]

According to Burnat, Fl. Alp. Marit. i. 274 (1892), nearly all of Allioni's specimens labelled *A. marina* are *S. media* (*S. marginata* of Burnat's treatment). But whatever Allioni's plant, his epithet is taken from Linnaeus and his combination must be kept for the group represented by the Linnaean type. Since, as shown above, the identity of this type is clear, there is no occasion to reject the epithet *marina*, as has been done by Briquet, Prod. Fl. Corse, i. 492 (1910), and others.

The type of *Tissa salina* var. *sordida* Greene does not differ in any characters from papillose-seeded plants of *S. marina*. Greene says, "herbage viscid and hairy; fl. in unilateral leafless racemes: . . ." Quantity of pubescence has little significance in classifying Spergularias and within *S. marina* itself all degrees may be found from very

[1] The citation often made, *Arenaria marina* Pall. Reise, iii. 603 (1776) is an error. Pallas used the name *A. maritima*, and only as a *nomen nudum*.

[2] Allioni also refers to his own Auctarium ad Synopsin methodicam Stirpium Horti Regii Taurensis, published in Miscellanea Taurinensia, v. 53–96 (1770–73). Here (p. 87) Allioni describes *Arenaria maritima* (overlooked by the *Index Kewensis* and most, if not all, authors), as an independent new species, said to differ from *A. campestris* in having ten stamens, capsule greatly exceeding the calyx and winged seeds. He particularly emphasizes the number of stamens. If, as Allioni evidently supposed, *A. maritima* were really synonymous with the true *S. marina*, the former name, as the earliest in the specific category, would have to be taken up for the present species. But the description, especially the number of stamens, suggests *S. media* rather than *S. marina;* and Burnat mentions no specimen of Allioni's labelled *A. maritima*. Until this last name can be attached to a definite type, it would be most unwise to take it up.

sparse hairs only on the pedicels to a dense covering over the whole plant. The flowers often occur in unilateral racemes, leafy or not, throughout the range.

Tissa salina var. *Sanfordii* Greene is also regarded as a synonym because, although the author has been unable to find the type, a specimen collected by C. F. Baker 2865, April 27, 1903, and determined by Greene as var. *Sanfordii* is identical in papillose seeds, capsules, sepals, size and habit with many of the collections here cited under *S. marina.* Greene's description, "Stems erect repeatedly dichotomous; herbage scarcely viscid and only slightly pubescent: inflorescence partly dichotomous, only the ultimate branchlets unilaterally racemose: seeds dark brown, nearly smooth, wingless," has nothing except "stems . . . repeatedly dichotomous," which makes it at at all different from *S. marina.* *S. marina* may, indeed, have several times compounded cymes. A high degree of dichotomy is seen in the type of *S. marina* var. *tenuis* (see below) but the Baker specimen discussed above has capsules too large for var. *tenuis.*

Greene's *Tissa sparsiflora* has as distinguishing characters: stems very long, nearly a foot in length; "flowers mostly solitary, one to each pair of leaves"; "slender pedicels shorter than the leaves"; "pedicels not forming a distinct cyme even at the ends of the branches"; "capsule ovate, obtusish, exceeding sepals." Greene seems to have named this plant because it came from the "interior of the continent" and because of its sprawling, long-noded stems which necessitates the flowers seeming to be sparse. All flowers of the genus are solitary, *i. e.* one at each node. Perhaps Greene meant that the plants were not cymose, for certainly pedicels do not make cymes. The type collection,[1] however, definitely has compound cymes, though they are obscured by general leafiness and sprawling stems. The description of the capsule shows no difference from that of *S. marina* and the seeds are typical of smooth-seeded plants. Therefore no distinguishing character remains but the sprawling stems, and that certainly is not sufficient for the separation of a taxonomic entity. More recent collections from Wyoming[2] show plants with much shorter stems and in some cases not at all lax.

[1] Seven Mile Lake, Wyoming, *Aven Nelson* 1158, October, 15, 1894. Prof. Nelson says that the label designates an uncharted lake 7 miles sw. of Laramie on the Woods Landing Road.

[2] Laramie, Wyoming, *Aven Nelson* 1868, September 3, 1895 (U. C., Pom.); Soda Lakes, *Aven Nelson* 5349, September 24, 1898 (U. C.).

13. Var. **tenuis** (Greene), comb. nov. (MAP 9). *Stems more highly branched: inflorescence crowded, with many flowers; sepals usually shorter*, 1.6–3.8 mm. long; *petals* usually shorter, 1.4–2.2 mm. long: *mature capsules usually shorter*, 3–4.4 mm. long, exceeding the calyx by 0.6–2 mm.: *seeds* as in the typical variety, though usually smooth in the specimens collected.—*Lepigonum tenue* Greene, Pittonia, i. 63 (1887). *Tissa tenuis* Greene ex Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, as to plants, including the *Greene* collection and excluding the *Rothrock* and *J. C. Nevin* plants, which are characteristic *Spergularia marina;* Greene, Fl. Francisc. 129 (1891) and Man. Bot. San Francisc. Bay, 37 (1894). *S. tenuis* (Greene) Robins. in Proc. Am. Acad. xxix. 311 (1894) and in Gray, Synop. Fl. i, pt. i, 251 (1897); Jepson, Fl. Calif. pt. 5, 494 (1914) and Man. Fl. Pl. Calif. 360 (1923). *S. tenuis* var. *involucrata* Robins. in Gray, Synop. Fl. i. pt. 1, 251 (1897). *Tissa salina* var. *involucrata* (Robins.) Jepson, Fl. W. Mid. Calif. 170 (1901). *T. salina* var. *tenuis* (Greene) Jepson, Fl. W. Mid. Calif. 170 (1901). *S. salina* var. *involucrata* (Robins.) Jepson, Fl. W. Mid. Calif. ed. 2, 156 (1911). *S. salina* var. *tenuis* (Greene) Jepson, Fl. W. Mid. Calif. ed. 2, 156 (1911); Munz, Fl. So. Calif. 164 (1935). *Alsine tenuis* (Greene) House in Am. Midl. Nat. vii. 133 (1921).—NORTH AMERICA: low alkaline places in the valleys of central California. CALIFORNIA: in alkali soil near Delano, Kern Co., *Burtt Davy* 2438, 1896 (U. C.); Tulare, Tulare Co., *K. Brandegee*, April, 1889 (G.); Hollister, San Benito Co., *Setchell*, April 14, 1897 (U. C.; see the same collection under *S. marina*); near Hollister, San Benito Co., *Eastwood & Howell* 4297, May 4, 1937 (Cal. Acad., G.; see coll. from same place, no. 4298, under *S. marina*); marsh, Alviso, Santa Clara Co., *Dudley*, November 9, 1903 (D. S.); near Newark, Alameda Co., *Burtt Davy* 1113, May 6, 1895 (U. C.); Mt. Eden, Alameda Co., *K. Brandegee*, April, 1891 (G., type of *S. tenuis* var. *involucrata* Robins.); Alameda, Alameda Co., *Greene*, May 17, 1887 (G., D. S., U. C., Notre Dame, TYPE of *Lepigonum tenue* Greene); Byron Springs, Contra Costa Co., *K. Brandegee*, May 8, 1916 (Pom.); Stockton, San Joaquin Co., *J. A. Sanford* 89, 1890–91 (U. C.; note on same sheet a collection, no. 341, of typical *S. marina* from same place); 12 miles north of Dixon, Yolo Co., *Doris K. Kildale* 5032, May 8, 1928 (D. S.; note coll. 5033 from same place under *S. marina*); hard-packed alkaline clay depression in the plains, 5 miles west of Colusa, Colusa Co., *G. B. & R. P. Rossbach* 638, May 31, 1938 (G., D. S., Cal. Acad.; note coll. no. 641 of *S. marina* in same herbaria from same place); Williams, Colusa Co., *K. Brandegee*, about 1891 (G., seeds papillose); roadside ditches, alkaline mud 3¾ miles south of Maxwell, Colusa Co., *G. B. & R. P. Rossbach* 640, May 31, 1938 (G., D. S.); alkaline ground near irrigation ditch, growing with *Distichlis*, 2 miles so. of Maxwell, Colusa Co., *G. B. & R. P. Rossbach* 636, May 31, 1938 (G., D. S., U. S., Cal. Acad., Pom., U. C., seeds papillose; note no. 637 under *S. marina* from the same place).

These plants are common within their range but nearly always occur along with characteristic *S. marina.* Var. *tenuis* always differs in being more slender, more highly branched, and more crowded with smaller flowers. Usually the capsule exceeds the calyx more than in typical *S. marina.* While collecting and observing these plants in 1938 from Colusa Co. to Yolo Co., the author found that the variety was always easily distinguished from the more typical forms of the species, no intergrades being found. The variety was also yellowed and dropping seeds, while the ordinary form of the species still remained green, with flowers and many buds. It would be interesting to note whether this difference in time of fruiting holds throughout its range. It certainly is evident in the Hollister collections, no. 4297 and 4298, of *Eastwood & Howell.* In spite of the fact that the only distinguishing characters are those of degree, these observations indicate to me that *Lepigonum tenue* of Greene should be retained in varietal rank.

Lepigonum neglectum var. *tenue* Kindb. Synop. Lepig. 6. (1856) is based upon a collection, "Ad littora maris Galliae prope Calvados," by *Lenormand* and is characterized briefly by Kindberg as having small flowers with greatly protruding capsules. Since the *Lenormand* collection cannot be found either in Uppsala or in Stockholm, nothing can be done at present to clear the situation—the use of the same epithet for groups evidently with the same characterization. The situation is further complicated by the fact that *L. neglectum* and *L. marinum* are synonyms. It seems doubtful that the two varieties can be the same.

14. S. ECHINOSPERMA Čelak. (PLATE 590, FIGS. 2a–2c and MAP 10). Annual; 1–∞ diffuse stems 5–20 cm. long; *internodes below the inflorescence* sparsely glandular-pubescent, 5–40 mm. long, 0.2–1.4 mm. in diameter; *lower bracts* foliaceous, about 12 mm. long, the upper ones minute, 1–3 mm. long: *leaves* sparsely glandular-pubescent, 8–35 mm. long, 0.4–1.4 mm. broad, usually not fascicled or with only 1 leaf in the axil: *stipules* deltoid, shorter than broad, 1.4–2.4 mm. long: *inflorescence* a lax cyme; the lowest *internodes* 7–25 mm. long, 0.2–0.6 mm. in diameter: *sepals* ovate, sparsely glandular-pubescent, 2.4–3.6 mm. long; *petals* pink or rosy at the apex, 1.6–2.8 mm., as much as 0.2–1.2 mm. shorter than the calyx; *stamens* 1–4; *styles* 3, separated to the base, 0.3–0.4 mm. long: *mature capsules* 3.4–5 mm. long, exceeding the calyx by 0.4–1.8 mm.: *fruiting pedicels* filiform, reflexed or not, 5–11 mm. long: *seeds* 0.5–0.8 *mm. long, deep reddish-brown or nearly black with a silvery tinge*, rounded in outline, *surface always roughened, often sculptured in irregular, vermiform pattern with irregular, short*

ridges between the sculpture, usually with dark brown, glandular papillae which sometimes are hardened, with a broad scarious white wing or not winged.—Arch. Naturw. Land. Boehm. iv. 867 (1881), published as a provisional name *i. e.* in parentheses after *S. rubra* var. *echinosperma* Čelak. *Tissa diandra* sensu Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889), in part, including only the *Lindheimer* and *Drummond* collections, excluding all other collections, which are of *S. diandra* and *S. atrosperma, q. v.*, non *Arenaria diandra* Guss. (1827); sensu Howell, Fl. Nw. Coast, 89 (1903), in part, including only the Texan plants, non *Arenaria diandra* Guss. (1827). *S. diandra* sensu Robins. in Proc. Am. Acad. xxix. 310 (1894), in part, including Texan plants only, non *Arenaria diandra* Guss. (1827). *S. salsuginea* var. *bracteata* Robins. in Gray, Synopt. Fl. i. 251 (1897), in part, including the Texan plants only. *Tissa bracteata* (Robins.) Small, Fl. Se. U. S. 418 (1903), in part, including Texan plants only.—North America: introduced in Texas and Alabama from the Old World. Alabama: low brackish, sandy seashore of Westfowl River, *Mohr*, April 7, 1870 (U. S.). Texas: Galveston Co.: Galveston, *Lindheimer*, 1843 (G., B., one of the Berlin sheets marked *Lepigonum neglectum* by Kindberg, 1861); beach, Galveston, *Joor*, April 19, 1875 (U. S.); Galveston Island, *Tharp* 2891, May 30, 1924 (U. S.). Brazos River, *Drummond*, 1833 (G., type of *S. salsuginea* var. *bracteata* Robins., K.). Nueces Co.: Corpus Christi, *Heller* 1413, March 5–12, 1894 (G., U. S., U. C.); Corpus Christi, *Benke* 5360, March 30, 1930 (G.). Padre Island (sw. shores of Texas), *Tharp* 5544, March 16, 1929 (U. S.). Pecos Co.: moist fine sands along Pecos River, near Pecos, *E. J. Palmer* 34027, May 18, 1928 (G.). Without definite locality, Texas, *Marel* (?), March (B.).

As is evident in the synonymy, this species has been included in *S. diandra*, which is also introduced, although only in the northwestern states and perhaps farther east. These two plants are very similar in habit, although *S. echinosperma* has the larger capsules not globose. *S. echinosperma* is easily distinguished, furthermore, by larger, brown, rounded seeds which are never so deeply sculptured as are usually the black, pyriform seeds of *S. diandra*.

15. S. congestifolia I. M. Johnst. (Plate 590, fig. 4a–4b and map 11). Suffruticose perennial: *tap-root* fibrous, with a soft, rough bark, extending deep into soil, up to 5 mm. thick: *caudex* heavy, branched or unbranched, bearing many (often 10–20) small crowded stems, 6–20 cm. long; *internodes of the stem below the inflorescence* usually *very short*, 1.5–8 mm. long and less than 1 mm. in diameter: *leaves densely fascicled, filiform,* strongly mucronate, sparsely glandular-pubescent, *falcate*, 3–10 mm. long, 0.3 mm. wide; *stipules white*, connate toward the base, *finely lacerate to nearly two thirds the length, giving the plant a silvery cast*, 3–5 mm. long: *inflorescence an open cyme, with much longer internodes, erect, high above leafy parts*, with minute, foliaceous *bracts*

1–3 mm. long: *sepals* ovate-lanceolate, glandular-pubescent, 5–5.5 mm. long; *petals* white or rosy-tinged, ovate, 4.5–5.7 mm. long; *stamens* 10; *styles* 3, 1–1.5 mm. long, united in young flowers and dividing probably to the base as flower matures: *capsules* (mature or nearly so) 5–6 mm. long, equal to or slightly exceeding the calyx: *fruiting pedicels* filiform, not reflexed (?), the lower 10–23 mm., usually 12–15 mm. long: *seeds* not winged, mature ones unknown.—Contrib. Gray Herb. lxxxi. 90 (1928); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru Pt. ii, no. 2, 630 (1937).—SOUTH AMERICA: found only in Peru near Mollendo, on arid hills of the coast. PERU: PROV. ISLAY: Dept. Arequipa: Mollendo: open places in the green belt, hillside back of port, *Johnston* 3567, October 16, 1925 (G. TYPE, U. S., F. M.); desert hills after October rains, *A. S. Hitchcock* 22415, November 17, 1923 (U. S.); carpeting arid hills near ocean, fog vegetation, *Ynes Mexia* 04166, November 16, 1935 (G., U. C.).

This is a very striking and beautiful species, different from all the others in its congested, falcate leaves just protruding from silky masses of lacerated stipules and its large flowers in tall inflorescences. There is need of fully fruiting material for complete knowledge of the species.

16. S. ARBUSCULA (Gay) I. M. Johnst. (PLATE 590, FIGS. 5a–5e and MAP 12). A *small perennial shrub: caudex* very heavy, ligneous, branched, bearing many erect or diffuse, rigid stems 6–30 cm. tall, becoming woody below, as much as 1 cm. thick, covered with a rough bark, scrubby with persistent, shrivelled leaves, stipules, and small, lateral branches: *internodes of the young branches below the inflorescence* densely covered with spreading, glandular pubescence, very much congested or as much as 1–16 mm. long, 0.4–0.8 mm. in diameter: *leaves fascicled*, glabrous or sparsely glandular-pubescent, not mucronate or very shortly so, *very fleshy*, 2–12 mm. long, 0.6–3 mm. broad; *stipules* conspicuous, shining, broadly lanceolate, not much longer than broad, *apex erose sometimes to as much as one-half its length*, 2.5–5 mm. long: *inflorescence a compact cyme; internodes crowded together* or as much as 4 mm. long, heavily glandular-pubescent; *bracts* wanting or foliaceous and as much as 2 mm. long: *sepals* linear, usually glabrous, sometimes glandular-pubescent at the base, 2.4–5 mm. long; *petals* white, ovate, 1.8–4 mm. long, as much as 0.4–1.6 mm. shorter than the calyx; *stamens* 10; *styles* 3, separated to the base or nearly so, 0.8–1.2 mm. long: *mature capsules* 1.6–3.6 mm. long, equal to or more often as much as 0.2–1.8 mm. shorter than calyx: *fruiting pedicels* filiform, glandular-pubescent, not reflexed, 1–3 mm. long: *seeds brown or nearly black, rounded at apex, shining, usually deeply sculptured in interwoven, vermiform pattern, occasionally with faint sculpture most noticeable near point of attachment of seed*, 0.6–0.8 mm. long, *not winged*.—Contrib. Gray Herb. lxxxv. 40 (1929). *Paronychia arbuscula* Gay, Fl. Chil. ii. 520 (1846); Reiche, Fl. Chile,

i. 211 (1896). *Arenaria teretifolia* Philippi, Fl. Atac. 10 (1860). *A. lignosa* Philippi, l. c. *S. lignosa* (Philippi) Rohrb. in Linnaea, xxxvii. 244 (1871–73); Philippi in Anal. Univ. Chil. lxxxi. 764 (1892). *S. fruticosa* Philippi, l. c. 763 (1892). *S. teretifolia* (Philippi) Philippi, l. c. lxxxi. 764 (1892). *Tissa lignosa* (Philippi) Reiche, Fl. Chile, i. 198 (1896). *T. teretifolia* (Philippi) Reiche, l. c. (1896).—South America: along the sea coast of Chile, in the provinces of Antofagasta, Atacama, and Coquimbo. Chile: Prov. Antofagasta: Dept. Taltal: sandy and rocky point on slope just back of Punta Reyes, vicinity of Aguada de Miguel Diaz ca. 24° 35′ S., *Johnston* 5357, December 1–4, 1925 (G., marked "flowers like type of *A. lignosa* Philippi in size and shape of calyx" by the collector, the plant with very small capsules, petals, and reflexed sepals); local in crevices on very dry granitic outcrop in a small quebrada just south of Posado Hidalgos, *Johnston* 5659, December 14, 1925 (G., U. S., seeds present); Cachinal de la Costa in Deserto Atacama, *Philippi*, December, 1853 (Santiago, photo. and fragment in G., type of *Arenaria lignosa* Philippi, sepals linear, reflexed, longer than the capsule); Cachinal de la Costa in Deserto Atacama, *Philippi* 170 (Santiago, photo. and fragment in G., type of *Spergularia teretifolia* Philippi, with short, broad, blunt sepals); Desert of Atacama, *Philippi* 65 (B., with short, narrow, reflexed sepals, marked *Arenaria lignosa*). Prov. Atacama: Dept. Chanaral: small stout bush 2–6 dm. tall, on hillsides and about rocks near the sea, hills back of El Barquito, vicinity of Puerto de Chanaral, 26° 23′ S., *Johnston* 4753, October 28–29, 1925 (G., U. S., seeds present). Dept. Copiapo: about rocks and in sand, 1–1.5 dm. tall, on a small point just north of Caldera ca. lat. 27° 3′ S., *Johnston* 5066, November 22, 1925 (G., U. S., seeds present, 2 of the 3 plants with short, broad sepals, not reflexed, marked "a fair match for type of *A. teretifolia* Philippi" by Dr. Johnston); same locality, *Johnston*, 6289, November 22, 1925 (G., with long sepals); vicinity of Caldera, *Gigoux* (G., two sheets, one not dated and one dated 1922); Caldera, *Werdermann* 385, November, 1924 (G., U. S., N. Y., F. M., B., Cal. Acad., U. C., over-mature); Morro de Copiapo se sur del puerto de Caldera, *Espinosa*, November 9, 1936 (D. S.), with long sepals, no seeds). Dept. Freirina: alt. ca. 20 m. Huasco, *Werdermann* 132, November, 1923 (G., F. M., B., Cal. Acad., U. C.); Huasco, *Jaffuel* 1166, November 2, 1930 (G., seeds present, sepals short and broad); Huasco, *Philippi*[1] (Santiago, photo. and fragment in G., type of *Spergularia fruticosa* Philippi, sepals very long and broad, far exceeding the capsule). No definite locality: Desert of Atacama, *Morong* 1172, September and October, 1890 (G, U. S., seeds present on G. spec., some plants with short broad sepals, others with them much longer); Atacama, *C. Porter* (K.). Prov. Coquimbo: Dept. Ovalle: Limari, Frai Jorge, *Werdermann* 894, November, 1925 (G., U. S., N. Y., F. M., B., Cal. Acad., Arnold Arb., U. C., seeds on B. spec. only, very long sepals);

[1] Date from Anal. Univ. Chile, lxxxi. 763 (1892), is October, 1866.

Loma, Frai Jorge, *C. & I. Skottsberg* 855, December 8, 1917 (N. Y.), seeds present; Coquimbo, ded. *Philippi*, 1888 (B., marked *Spergularia fruticosa*); Chile, no locality on label,[1] *Cl. Gay* (K., G., TYPE COLLECTION of *Paronychia arbuscula* Gay, in poor condition).

There is a great range of variation among the plants cited and described above. There are plants with short, broad, blunt sepals about equal to the capsule, as in the type of *Arenaria teretifolia* Philippi, and there are others with long blunt sepals greatly exceeding the capsule, as in the type of *Spergularia fruticosa* Philippi. The type of *Paronychia arbuscula* Gay has the "calyx lobes oblong-ovate, very glabrous, equal to or slightly exceeding the membranaceous petals." Often plants may have linear, reflexed sepals, as in the type of *Arenaria lignosa* Philippi. Though most of the collections lack seeds, those seen show no fundamental variation. It should be said, however, that seeds of plants with linear, reflexed sepals have never been seen. In spite of the above variations it seems quite possible that they all belong to the same taxonomic unit, for they all have the distinctive, shrubby habit, the same type of stipule, number of stamens, type of style, etc.

(To be continued)

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(*Continued from page 143*)

17. S. FASCICULATA Philippi (PLATE 593, FIGS. 1a–1d and MAP 13). Perennial: *caudex* well developed, branched and knotted, bearing 2–∞ diffuse, often rebranching stems,[1] 10–30 cm. long; *internodes of stem below the inflorescence* 5–35 mm. long, 0.6–1.1 mm. in diameter, shortly glandular-pubescent, only the oldest internodes becoming nearly glabrous by shedding their pubescence: *leaves densely fascicled*, setaceous, glandular-pubescent, usually filiform, but occasionally fleshy, 6–30 mm., usually 10–20 mm. long, 0.2–1 mm., usually 0.2–0.6 mm. wide; *stipules broadly lanceolate, lacerate at the tip or usually for as much as one half their length*, 4.5–7 mm. long: *inflorescence a short, open cyme*, glandular-pubescent throughout; *the internodes* 6–30 mm., usually 9–15 mm. long, 0.2–0.6 mm. in diameter; *bracts* 1–6 mm. long, the upper minute, *sepals* linear-lanceolate, glandular-pubescent, 5–10 mm.,[2] usually 5–8 mm. long; *petals* white, ovate, 4–10 mm., usually 4–6 mm. long, equal to or as much as 1.5 mm. shorter than the calyx; *stamens* 10; *styles* 3, 1.5–2.5 mm. long, *united when young, separating to as much as 0.6 mm. from the apex as flower matures: mature capsules* 5–7 mm. long, equal to the calyx or overtopped by the calyx by as much as 2 mm., or occasionally exceeding the calyx by as much as 1 mm.:[3] *fruiting pedicels* not reflexed, filiform, 6–17 mm. long: *seeds dark reddish brown or nearly black, often silvery, nearly pyriform in outline, deeply sculptured in closely interwoven, vermiform pattern, covered with lighter brown glandular papillae, or not papillose*, 0.8–1 mm. long, *surrounded by a narrow, white or brownish, scarious wing with entire margin less than* 0.1 mm. wide, *or not winged.*—Anal. Mus. Nac. Chile, viii. (Cat. Prael. Pl. Itin. Tarapaca, F. Philippi Lect.) 6 (1891). *Tissa Stuebelii* Hieron. in Engl. Bot. Jahr. xxi. 308 (1895). *T. fasciculata* (Philippi) Reiche, Fl. Chile, i. 197 (1896). *S. Stuebelii* (Hieron.) I. M. Johnston in Contrib. Gray Herb. lxxxi. 90 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 633 (1937). *S. media* sensu Macbride, l. c. 632 (1937),[4] non *Arenaria media* L. (1762). *S. laciniata* Baehni & Macbride ex Macbride, l. c. 631.—SOUTH AMERICA: in the mountains of Peru and adjacent Chile. PERU: DEPT. LIBERTAD: Prov. Huamachuco: roadway between Oyon and Hamade de Peñon, Distr. Cajatambo, *Raimondi* 2110, April, 1868 (B.). DEPT. ANCASH: Prov. Cajatambo: growing with

[1] Also stems of the last growing season may give rise to new stems at their nodes.

[2] *C. Troll* 3161 has some of the sepals 10 mm. long but a style 2.5 mm., united nearly to apex and 10 stamens.

[3] See *R. S. Williams* 2560 (K., N. Y.).

[4] Cites *Weberbauer* 2751 (?) Ocros, Ancash, which is immature. Macbride's description here seems to be a peculiar combination of the characters of true *S. media* and of the Weberbauer plant, which is *S. fasciculata* (see citations!). A comparison of the diagnostic characters of these two species will show their great dissimilarity.

Cactaceae and Bromeliaceae, 3000–3200 m. alt., Ocros, *Weberbauer* 2751, March 31, 1903 (B., immature). Dept. Lima: Prov. Lima: mountains near Choisica (Lima-Aroyo R. R.) 1700–1800 m. alt., *Weberbauer* 5334, April, 1910 (G., U. S., F. M., immature). Dept. Ica: Bahia de la Independencia, Cerro Quemado, *Weberbauer* 7958, August 5, 1927 (F. M., photo in G., type collection of *Spergularia laciniata* Baehni & Macbride, type not seen). Dept. Ayacucho: Prov. Lucanos: between Sancos and Chaviña, *Raimondi* 10119, September, 1863 (B., sepals equal to the capsule). Dept. unknown: Lomas de Capac, Cerca de Chala, *Raimondi* 10179, November, 1863 (B., immature). Dept. Arequipa: Prov. Camaná: Atiquipa, *Raimondi* 12989 (B., sepals equal to or slightly shorter than the capsule, leaves fleshy). Prov. Arequipa: 8400 ft. alt., Yura, *R. S. Williams* 2560, August 10, 1901 (U. S., N. Y., K., capsule exceeding the sepals); in quarries at the foot of Mt. Misti, Arequipa, *Stübel* 79, February 15, 1877 (B., photo in G., type of *Tissa Stuebelii* Hieron., capsule shorter than the calyx (6 mm.)); dry gravelly river bed, 2500–2600 m. alt., above Arequipa, *Pennell* 13156, April 7–16, 1925 (G., U. S., N. Y., F. M., seeds not papillose); on rocky slopes (2800–2900 m. alt.) above Arequipa, *Pennell* 13247, April 6–16, 1925 (G., U. S., N. Y., F. M., immature); 8000–9000 ft. alt., Arequipa District, *D. Stafford* 354, April, 1934 (K., immature), local name "Estrellita de Cerro"; ravines, Pampa on southern slopes of Mt. Chachani (3050 m. alt.), north of Arequipa, *Hinkley* 10, March, 1920 (G., U. S., F. M., immature); 7600 ft. alt. Arequipa, *G. H. H. Tate* (Ladew Exped.) 1197, June, 1926 (N. Y.). Dept. Tacna: Prov. Tacna: Alto de Tacora, *Juan Isern* (Comision Cientifica de Pacifico) 2277, June 22, 1863 (F. M.). Chile: Prov. Tarapacá: Dept. Tarapacá: 3500–3800 m. alt., Cord. Quebrada de Quipisca, Noasa, *Werderman* 1841, March, 1926 (B., immature, but stamens 10 and style 2.5 mm. long and almost entirely united); between Jaina and Chasmisa, *F. Philippi* (Santiago, TYPE, photo. in G., immature). Prov. unknown: Paychama (3800 m. alt.) *Troll* 3161, March 9, 1927 (B., immature but sepals sometimes 10 mm. long, style united nearly to the apex (2.5 mm. long) and the stamens 10).

This species varies a great deal in comparative length of sepals and capsule. It also varies from a long-noded, sprawling habit, with filiform leaves, to a shorter-noded, more erect habit, with fleshy leaves (*Raimondi* 12989 and 10179). One plant (*Pennell* 13156) has non-papillose seeds but it matches many papillose-seeded plants in habit and all important characters. Occurrence of both types of seeds is another example of a phenomenon common to many of the species of *Spergularia*.

Hieronymus, in his description of *Tissa Stuebelii*,[1] says *S. fascicu-*

[1] Hieron. in Engler, Bot. Jahr. xxi. 308 (1895).

lata Philippi differs from his species in having a covering of short, crowded, erect hairs and a shorter calyx, 5 mm. in length. The type of *T. Stuebelii* is itself covered with pubescence. Since Hieronymus did not have many collections to study, he could not have known that the sepals may vary greatly in length.

Macbride,[1] in his key to the Spergularias of Peru, says *S. laciniata* has the lowest internodes slightly shorter than the leaves, and stipules fimbriate to one half their length, as contrasted with *S. Stuebelii* which has the lowest internodes much exceeding the leaves and the stipules lacerate only above. The length of the internode as compared with that of the leaves is never a diagnostic character in the genus. In this species the stipules vary greatly in depth of laceration, with no supporting characters nor geographic range to separate the extremes.

It is unfortunate that all the Chilean specimens are immature, but the flowers all have 10 stamens and the same length and type of style as the Peruvian specimens. The habit, stipules, and leaves are similar.

18. S. ANDINA Rohrb. (PLATE 593, FIGS. 2a–2c and MAP 14). Prostrate perennial: *caudex* bearing many crowded, slender stems, usually 10–20 or more, 2–8 cm. long; *internodes* of stem below the inflorescence 3–10 mm., usually 6–10 mm. long, less than 1 mm. in diameter: *leaves* not fascicled, mucronate, linear-filiform, glabrous, 7–15 mm. long, 0.4–0.8 mm. wide; *stipules* triangular-acuminate, 3–6 mm. long, connate from the base for 1–2 mm.: *inflorescence compact and leafy*, not sharply differentiated from the vegetative parts, *few-flowered*, the *internodes* shorter, 2–5 mm. long; *bracts* foliaceous, nearly as long as lower leaves: *sepals lanceolate, with heavy, spreading, glandular pubescence on the lower half and without curving tips, hooded at the summit*, 3.5–5 mm. long; *petals* broadly ovate, white or pink-tinged, 2–4 mm. long, 1–1.8 mm. shorter than the sepals; *stamens* 10; *styles* 3, always separated to the base: *mature capsules* 3–4 mm. long, exceeded by the calyx by as much as 0.5–1.2 mm.: *fruiting pedicels* very short, 0.5–2.5 mm. long: *seeds brown, rounded at the summit, covered with deep, close, vermiform sculpture and large, cup-shaped, brown, glandular papillae, giving the surface an incrusted appearance*, 0.6–0.8 mm. long, not winged.—Linnaea, xxxvii. 234 (1871–1873); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 629 (1937).—SOUTH AMERICA: in the Andes of Peru and Bolivia of the region of Lake Titicaca, 3850–4100 m. alt. PERU: DEPT. PUNO: Azangaro, *Lechler* 1772, June, 1854 (K. TYPE; B.); *Weberbauer*, 456 February 28, 1902 (B.). BOLIVIA: DEPT. LA PAZ: Achacache, Prov. Omasuyos, reg. alp., 3950 m.,

[1] Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 631 (1937).

Mandon 947 (Geneva; photo. and fragm. F. M.); La Paz, *Buchtien* 594, March, 1910 (N. Y., U. S., Leiden) and 594, February 20, 1907 (U. S.).

Rohrbach with his description of this species cites three different collections, *d'Orbigny* 1499, *Mandon* 947, and *Lechler* 1772, from which I choose *Lechler* 1772 as the type. The *d'Orbigny* specimen, which I have not seen, came from Potosi and, if correctly identified, would extend the range much farther south.

19. S. DEPAUPERATA (Gay) Rohrb. (PLATE 593, FIGS. 3a–3c and MAP 15). *Prostrate perennial forming cushions: caudex* bearing many persistent stems, branching repeatedly at each growing season, 5–16 cm. long: *internodes of stem below the inflorescence very short*, 1–7 mm. long: *leaves* fascicled or not, linear-filiform, strongly mucronate, glabrous or sparsely glandular-pubescent, 4–20 mm., usually 7–13 mm. long, about 0.5 mm. wide; *stipules* triangular-acuminate, 2.5–6.5 mm. long: *inflorescence* open, *few-flowered, sharply differentiated from lower parts with foliaceous bracts minute or wanting* and internodes glandular-pubescent, 6–14 mm., usually 8–12 mm. long: *sepals* ovate-lanceolate, often distinctly fleshy, densely glandular-pubescent, scarious-margined, 4–5.5 mm. long; *petals* white, ovate, 4–6 mm. long, equal to or exceeding calyx by as much as 1 mm.; *stamens* 6–10; *styles* 3, 0.6–1.4 mm. long, united or divided partially or completely to the base: *mature capsules* 4.8–5.5 mm. long, equal to or slightly exceeding the calyx by as much as 0.5 mm.: *fruiting pedicels* filiform, usually glandular-pubescent, reflexed or not, the lower 6–15 mm. long: *seeds light brown, rounded in outline, surface lightly roughened or pebbled in casual vermiform pattern, covered with regularly spaced, glandular hairs branched at the tips*, 0.8–1 mm. long, *surrounded by strap-like appendages*, 0.3–0.6 mm. wide, *made by deep lacerations of a papery wing*.—Linnaea, xxxvii. 231 (1871–1873). *Arenaria depauperata* Gay, Fl. Chile, i. 270 (1845). *Lepigonum depauperatum* (Gay) Kindberg, Synop. Lepig. 11 (1856) and Mon. Lepig. 25 (1863). *L. grandiflorum* Kindberg, l. c. 34, t. 3, fig. 22 (1863). *S. grandiflora* (Kindb.) Rohrb. in Linnaea, xxxvii. 235 (1871–73). *S. depauperata* Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuevas Chil.) 765 (1892), in *obs.*, new combination based on *Arenaria depauperata* but with no reference to literature. *S. tenella* Philippi, l. c. 766 (1892). *S. Rengifoi* Philippi, l. c. 769 (1892). *Tissa depauperata* (Gay) Reiche, Fl. Chile i. 200 (1896). *T. depauperata* var. *tenella* (Philippi) Reiche, l. c. *S. depauperata* var. *tenella* (Philippi) Hauman & Irigoyen in Anal. Mus. Nac. Hist. Nat. Buenos Aires, xxxii. 191 (1923), nom. in synonymy.—SOUTH AMERICA: in the Andes of central Chile and adjacent Argentina in the vicinity of the international boundary from the province of Aconcagua, Chile, south to the province of Rio Negro, Argentina. CHILE: PROV. ACONCAGUA: Uspallata Pass der Chilenischen Hochcordillere, Juncal, in Felsspalten, *Buchtien* 1132, February 13, 1903 (G., U. S., B.). PROV. SANTIAGO: in monte S. Pedro Nolasco,

32 m. s. m., *Carlos Rengifo* (Santiago, photo., fragment and seed in G., type of *Spergularia Rengifoi* Philippi). PROV. NUBLE: near Ternias, Chillan, *F. Deltor* 2066, February 15, 1931 (G.); Cordilleren von Chillan, *Felsen* 142, April 19, 1925 (B.); rupium fissuris Pico de Pilque, Andes de Antuco, *Pöppig*, 1828[1] (B., Geneva (photo in F. M.), F. M.; one of the Berlin sheets is marked *Lepigonum grandiflorum* (Poepp.) by Kindberg); without locality, Gay (G., type collection, type in Paris[2]). PROV. CAUTIN: Cerro Castillo, valle Malaco, Anden Valdivia, *Neger*, April, 1897 (B.). Chile, without locality or date: *Bridges* (B.); *Poeppig* (Leiden). ARGENTINA: PROV. RIO NEGRO: crevices of rocks, alt. 770 m., cushion-forming, Gobernacion Rio Negro, bridge over Rio Niri Huau, near San Carlos de Bariloche, *James West* 4770, December 15, 1935 (G., U. C.). PROV. NEUQUEN: growing in the driest rocks, 4500 ft., Liu Cullin, Gob. de Neuquen, *H. F. Comber* 304, December 12, 1925 (K.).

It is difficult to say who is the real author of the name *depauperata.* The label of the type collection in Gray Herbarium has *Arenaria depauperata* Naud. and Kindberg and Reiche both attribute it to Naudin. However, Gay must be considered the author since there is no author cited at the end of the "Cariofilieas" in Gay, Flora Chile. as there is after the "Elatineas," the next family treated.

The name *Lepigonum grandiflorum,* used by Kindberg in 1863 (see Mon. Lepig.) for the *Pöppig* collection, has its source in manuscript and herbarium names of Pöppig and Fenzl.[3] Since the *Pöppig* plants have no mature fruit, Kindberg, using the capsules and seeds as his fundamental key-characters, did not notice the almost exact similarity of *L. grandiflorum* and *L. depauperatum,* which was based upon the *Gay* collection, also immature, and kept up both species. In 1871–73, Rohrbach also kept both species but did not have the Gay collection and expressed his ignorance of *S. depauperata.*

The type specimens of both *S. tenella* and *S. Rengifoi* of Philippi are almost exact matches for the Gay collection.

20. S. PISSISI (Philippi) I. M. Johnston (PLATE 593, FIGS. 4a–4c and MAP 16). *Perennial, forming large mats,* 7–13 cm. high; new stems branching from nodes of the old; *internodes of stem below the inflorescence very short,* glabrous or covered with very short glandular pubes-

[1] Poeppig was in the region of Antuco, Chile, only from October, 1828, to March, 1829 (Poppig & Endl., Nov. Gen. & Sp. I. Prol. iii. 1835). Therefore "1830," given on the Geneva specimen can not be the date of collection. It presumably is the date of receipt.

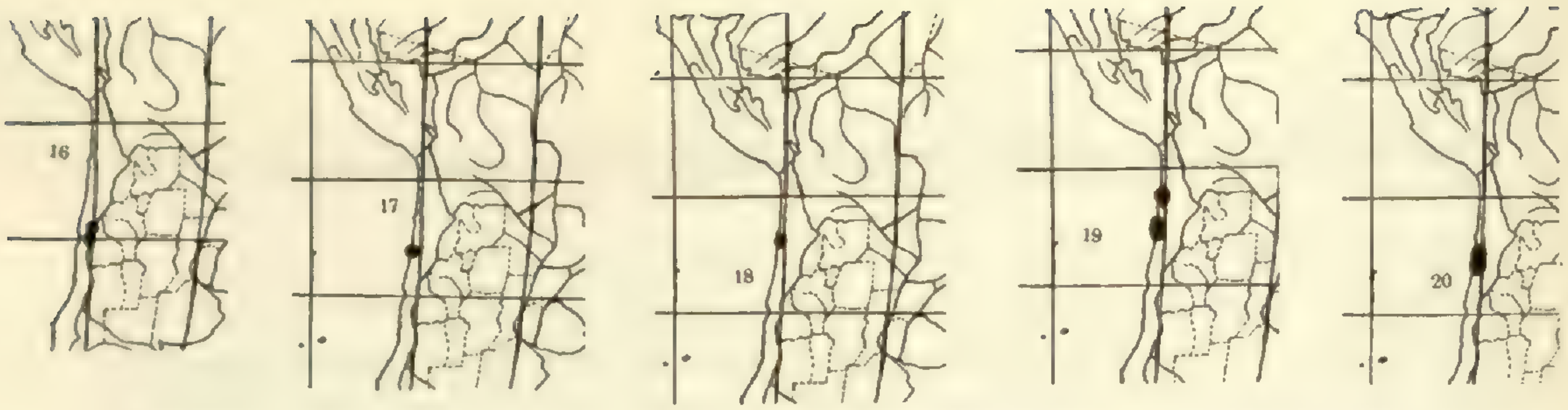
[2] Kindb. Mon. Lepig. 26 (1863), says this collection is in Paris. I have not examined it but assume that it is the same as the Gray specimens.

[3] Mus. Bot. Berol. has a specimen which was marked by Fenzl as *Spergularia grandiflora* Poepp. (1835), and by Kindberg as *Lepigonum grandiflorum.*

cence, *soft with a corky appearance*, 1.5–7 cm. long, 0.4–1.5 mm. in diameter: *leaves* fleshy, mucronate, fascicled, densely glandular-pubescent, 2–7 mm. long, 0.8–1 mm. broad; *stipules* narrowly lanceolate, not attenuate, not erose, white, silvery, 3–5.4 mm. long: *inflorescence only one- or two-flowered: sepals fleshy*, heavily glandular-pubescent, often purple-tinged at the margins, 4–5.4 mm. long; *petals* white, ovate, 3.6–4.5 mm. long, 0.4–1.4 mm. shorter than the calyx; *stamens* 10; *styles* 3, *united about two-thirds of their length*, 1–1.8 mm. long: *mature capsules* 5.4 mm. long, 0.4 mm. longer than the calyx: *fruiting pedicels* filiform, densely glandular-pubescent, 3–5 mm. long, probably reflexed when mature: *seeds dark brown with a silvery tinge, rounded in outline, delicately sculptured in closely interwoven, vermiform pattern, not papillose*,[1] 1 mm. long, *surrounded by a narrow, scarious, entire-margined wing*, 0.1 mm. wide.—Revist. Chil. Nat. xxxiii. 26 (1929). *Arenaria Pissisi* Philippi in Linnaea, xxxiii. 20 (1864). *Tissa Pissisi* (Philippi) Reiche, Fl. Chile, i. 200 (1896).—SOUTH AMERICA: in the Cordilleras of Chile only in the provinces of Atacama and Coquimbo at about 4000 m. alt. CHILE: PROV. ATACAMA: Dept. Vallenar: on gravelly, sod-covered bank of Laguna Chica, ca. lat. 28° 48′ S., long. 69° 51′ W. (about 3800 m. alt.), *Johnston* 5952, January 6–7, 1926 (G.); about small vegas below pass on west slope of Cerro Negro, in gravel, mats becoming over a meter broad, Quebrada Alfalfa (Q. de los Pozos), ca. lat. 28° 52′ S., long. 69° 49′–54′ W. (ca. 4000 m. alt.), *Johnston* 5985, January 7–8, 1926 (G., U. S.); Cordillera Laguna Chica (alt. ca. 4000 m.), *Werdermann* 255, January, 1924 (G., U. S., U. C.). PROV. COQUIMBO: Dept. Elqui: Baños del Toro, *Volkmann* 18 $\frac{60}{61}$ (Santiago, TYPE, photo. in G.); Baños del Toro, *Reed* (K.); Baños del Toro *F. Philippi* 171 (Santiago, photo. in G., agrees with the Kew specimen); 3600 m. alt., Baños del Toro, Valle del Rio Toro, Cordillera de Elqui, *Espinosa*, February 26, 1938 (G., the only collection with mature seeds).

21. S. CREMNOPHILA I. M. Johnston (PLATE 593, FIGS. 5a–5e and MAP 17). Perennial: *root* very heavy, ligneous, as much as 1 cm. thick: *caudex* well developed, bearing many diffuse stems, 13–30 cm. long; *internodes below the inflorescence* heavily glandular-pubescent, 6–15 mm. long, 0.7–1.4 mm. in diameter: *leaves fleshy*, mucronate, glabrous or sparsely glandular-pubescent, fascicled or not, 6–18 mm. long, 1–3 mm. wide: *stipules* broadly lanceolate, variable in length as compared to width, erose at the apex, 1.6–5 mm. long: *inflorescence* a lax leafy cyme; *internodes* densely glandular-pubescent, the lowest 7–20 mm. long, 0.4–1 mm. in diameter; *bracts* foliaceous below, minute above, 1–11 mm. long, glabrous or glandular-pubescent: *sepals* ovate-lanceolate, densely glandular-pubescent, 5–8 mm. long; *petals* white, ovate, 4.4–6 mm. long, equal to the calyx or as much as 2 mm. shorter;

[1] This does not mean that the seeds may never be papillose. The description is based upon the single mature collection known, sent to me by Sr. Marcial R. Espinosa of the Museo Nacional of Santiago, Chile.



Ranges of, 16, SPERGULARIA PISSISI; 17, S. CREMNOPHILA; 18, S. ABERRANS; 19, S. STENOCARPA; 20, S. DENTICULATA; 21, S. CERVIANA; 22, S. FLORIBUNDA; 23, S. PYCNANTHA; 24, S. CONFERTIFLORA; 25, S. VILLOSA (in 2 sections but not showing Oregon station); 26, S. SPRUCEANA; 27, S. COLOMBIANA; 28, S. PLATENSIS; 29, S. RAMOSA (three additional stations farther south, in Terr. Santa Cruz); 30, S. RAMOSA var. DIFFUSA; 31, S. LEVIS (an additional station farther south, in Terr. Santa Cruz); 32, S. GRANDIS; 33, S. PAZENSIS; 34, S. RUPESTRIS.

stamens 8–10; *styles* 3, separated to the base or united at most for one-half their length, 0.6–2 mm. long: *mature capsules* 5–6.6 mm. long, equal to the calyx or as much as 2.4 mm. shorter: *fruiting pedicels* filiform, densely glandular-pubescent, spreading but not reflexed, the lowest 8–22 mm. long: *seeds brown, with the surface either dull and sculptured in interwoven, vermiform pattern with occasional small papillae* (as in the type), 0.8–1 mm. long, *or lustrous and smooth with a suggestion of delicate, vermiform tracery,*[1] 0.7–1.2 mm. long, *surrounded by a hard, brown, narrow rim which is often sculptured in vermiform ridges.*—Contrib. Gray Herb. lxxxv. 41 (1929).—South America: grows in coastal Chile in the province of Antofagasta near the Atacama line. Chile: Prov. Antofagasta: Dept. Taltal: crevices at head of high fog-bathed sea-cliff near Aguada Cachina, waterhole in Quebrada Cachina, ca. 6 km. inland from Caleta Esmeralda, ca. lat. 25° 53′ S., *Johnston* 5683, December 15, 1925 (G. type, U. S., F. M., seeds dull, sculptured, papillose, 0.8–1 mm.); prostrate on exposed foggy slopes about summit of Cerro de la Cachina, near Aguada Cachina, *Johnston* 5684, December 15, 1925 (G., U. S., seeds glossy, 1–1.2 mm. long); decumbent on moist, fog-bathed, gravelly slopes at head of Quebrada, above the waterhole, near Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, ca. lat. 26° 2′ S., *Johnston* 5821, December 18, 1925 (G., U. S., F. M., seeds small, lustrous, 0.7–0.8 mm. long, stipules much shorter than in the previous two collections).

These three collections show great variability in type of seed (see citations), length of stipule, type of leaf, and length of sepal in comparison with petals and capsule. The seeds seem too widely different to belong to the same species but no other character can be found to support setting them apart. Glossy-seeded plants have both extremes of stipules and both extremes of leaves and all types of sepals.

Further collections are needed for more accurate understanding, either for support of this treatment or as evidence for some other.

22. S. aberrans I. M. Johnston (Plate 594, figs. 1a–1c and map 18). Perennial: *caudex* bearing many diffuse stems 20–40 cm. long; *internodes of stem below the inflorescence* glandular-pubescent, 10–35 cm. long, 0.6–1.2 mm. in diameter: *leaves* fascicled, mucronate, glabrous, 15–30 mm. long, 0.4–1 mm. wide; *stipules* broadly lance-acuminate, lacerate at the apex, 5–6 mm. long: *inflorescence* a short, open cyme, few-flowered, glandular-pubescent throughout; the *lowest internodes* 12–30 mm. long, 3–4 mm. in diameter; *bracts* 2–6 mm. long, glandular-pubescent: *sepals* linear, acute-tipped, glandular-pubescent, 4.8–5.6 mm. long; *petals* ovate, white, nearly equal to the

[1] This looks as though a seed like those of the type but without papillae had been heavily varnished, leaving only the slightest suggestion of what might have been deep sculpture!

calyx, 4.6–5.4 mm. long; *stamens* 5; *styles* 3, united when young, dividing to at least half their length as flower matures, 1–1.8 mm. long: *mature capsules* 4–5.4 mm. long, equal to or slightly exceeded by the calyx: *fruiting pedicels* not reflexed, filiform, 10–15 mm. long: *seeds dark, sepia-brown, rounded in outline, surface sculptured in interwoven, areolar, vermiform pattern, covered with dark brown papillae,* 0.8–0.9 mm. long, *surrounded by a narrow, dark brown wing, which is also sculptured in vermiform pattern next to the seed,* at most 0.1 mm. wide.—Contrib. Gray Herb. lxxxv. 147 (1929).—South America: only in the northern part of Chile in the province of Antofagasta. Chile: Prov. Antofagasta: Dept. Antofagasta: in rock crevices, base of hills just southeast of La Chimba, Antofagasta, *Johnston* 3631, October 19, 1925 (G., type); Antofagasta, *Jaffuel* 1136, October 29, 1930 (G.). Dept. Tocopilla: Tocopilla, *Jaffuel* 1007, October 27, 1930 (G.), probably, but no fruit or flowers.

S. aberrans was so named because of its "reduced androecium and united styles." This condition was considered by Dr. Johnston as atypical of the genus. However, five stamens are to be found in many species, such as *S. marina, S. canadensis, S. denticulata, S. stenocarpa, S. floribunda* and *S. platensis;* and united styles may occur in the following species: *S. fasciculata, S. Pissisi, S. cremnophila, S. stenocarpa, S. rupestris,* and *S. depauperata.*

23. S. stenocarpa (Philippi) I. M. Johnston (Plate 594, figs. 2a–2d and map 19). Annual or perennial: *caudex* bearing 3–∞ diffuse stems, 9–35 cm. long, usually many, which in turn may branch several times; *internodes of stem below the inflorescence* 8–40 mm., usually 20–30 mm. long, 0.5–1.2 mm. in diameter, nearly glabrous or usually covered with short glandular pubescence: *leaves* glabrous, *fascicled,* mucronate, 11–40 mm., usually 15–30 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, acuminate, slightly lacerate at the tip, 2.5–5 mm., usually 3–4 mm. long: *inflorescence an open, leafy, compound cyme; internodes* shortly glandular-pubescent, the *lowest* 8–30 mm., usually 13–25 mm. long, 0.3–0.8 mm. in diameter; *bracts* foliaceous below, minute above: *sepals linear-attenuate, the outer occasionally mucronate,* glabrous, 3–4.6 mm. long; *petals* white, ovate, 2.8–3.2 mm. long; *stamens* 5; *styles* 3, united when young, separating at least half their length or nearly to the base as flower matures, 0.8–1 mm. long: *mature capsules* 3.2–4.8 mm. long, *equal to or exceeding the calyx* by as much as 0.2–0.8 mm.: *fruiting pedicels* not reflexed, filiform, glandular-pubescent, the lowest 6–12 mm., usually 9–11 mm. long: *seeds brown, lustrous, smooth or slightly roughened with a suggestion of sculpture in vermiform pattern,* 0.4–0.7 mm. long, *not winged but sometimes with a very narrow, brown rim.*—Contrib. Gray Herb. lxxxv. 41 (1929). *Arenaria stenocarpa* Philippi, Fl. Atac. 10 (1860) and Viage Des. Atac. 19, 184 (1860). *S. Larrañagae* Philippi in Anal. Univ.

Chile, lxxxi. 767 (1892). *S. Borchersi* Philippi in Anal. Univ. Chile, lxxxi. 769 (1892). *Tissa Borchersi* (Philippi) Reiche, Fl. Chile, 199 (1896).—SOUTH AMERICA: known only on the coast of Chile in the province of Antofagasta. CHILE: PROV. ANTOFAGASTA: Dept. Tocopilla: Tocopilla, *Jaffuel* 1017, October 27, 1930 (G., seeds large but plant in poor condition); Cobija, *Gaudichaud*, July, 1836 (G., seeds large, only scraps of a plant). Dept. Taltal: prostrate on gravelly slope near Perales, vicinity of Paposo, Quebrada de Guanillo, *Johnston* 5604, December 8, 1925 (G., seeds large, spec. marked "the large plant has the calyx and flower-size of the type of *S. Larrañagae* Ph!" by Johnston); decumbent on rocky seaward slope between Quebrada San Ramon and Poso Malo, *Johnston* 5177, November 28, 1925 (G.); prostrate annual on gravelly bench just back of beach, petals white, Caleta de Hueso Parado, vicinity of Taltal, *Johnston* 5162, November 26, 1925 (G., U. S., outermost sepals mucronate but capsule and habit typical); Hueso Parado, *Philippi* (Santiago, TYPE, photo. and fragment in G.); Taltal, about 50 m. alt., *Werdermann* 799, October, 1925 (G., U. S., B., F. M., Cal. Acad., U. C., outermost sepals mucronate but habit typical); dry hillside about 8 km. south of town in Quebrada de Infieles, vicinity of Taltal, *Johnston* 5641, December 13, 1925 (G., U. S., plant small, more compact than any of the preceding); Quebrada de Taltal, *Montero* 2897, September 10, 1936 (G.); Puerto Oliva near Taltal, *Borchers* 2286, 1887 (Santiago, photo. and fragment in G., type of *Spergularia Borchersi* Philippi); Breas, *Larrañaga*, 1888 (Santiago, photo. and fragment in G., type of *Spergularia Larrañagae* Philippi, identification not absolutely positive).

There is a great seed variation, as will be noticed in the figure and citations. It is possible that, with many more collections, the larger-seeded plants might be found to have a more northerly range and enough constant characters to set them apart taxonomically. At present it seems best to include them all in *S. stenocarpa*.

The type of *Spergularia Larrañagae* Philippi is immature but, since its sepals are only very slightly mucronate, it is here included, although with more collecting plants like it may possibly be found to belong to *S. denticulata*. The fact that it was collected between the general ranges of the two species is significant. Its immaturity prevents any sure classification.

24. S. DENTICULATA Philippi (PLATE 594, FIGS. 3a–3c and MAP 20). Annual: *caudex* bearing 5–∞ diffuse, branching stems 4–17 cm. long: *internodes of stem below the inflorescence* few in number, covered with short, glandular pubescence, 5–24 mm., usually 10–20 mm. long, 0.4–1 mm. in diameter: *leaves* glabrous, mucronate, *usually not fascicled*, 8–20 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, 2.2–3.8 mm. long, only slightly lacerate at the tip: *inflorescence a crowded*

compound cyme; internodes covered with short, glandular pubescence, the lowest 5–18 mm. long, 0.3–0.9 mm. in diameter; *bracts* foliaceous, 3–12 mm. long: *sepals linear,* glabrous, *usually with attenuate, scarious or setaceous apices, sometimes blunt in the inner sepals,* 4–4.8 mm. long; *petals* white, ovate, 2.6–3.2 mm. long; *stamens* 5; *styles* 3, separated to the base, 0.6–0.8 mm. long: *mature capsules* 3–4 mm. long, *exceeded by the calyx* by as much as 0.4–1.6 mm., usually 0.8–1.2 mm.: *fruiting pedicels* not reflexed, sparsely glandular-pubescent, filiform, 2–9 mm. long: *seeds brown, dull with a smooth or slightly hubbled surface,* 0.5–0.6 mm. long, *not winged but often surrounded by a very narrow, brown rim.* —Anal. Univ. Chile, lxxxi. 769 (1892). *Arenaria denticulata* Philippi, Fl. Atac. 10 (1860). *Tissa denticulata* (Philippi) Reiche, Fl. Chile, i. 199 (1896).—South America: only on coast of Chile in the provinces of Antofagasta and Atacama. Chile: Prov. Antofagasta: Dept. Taltal: one plant on dry rocky slope just north of summit of Porto Mina Carola, Sierra Esmeralda, along trail between Posado Hidalgos and Quebrada Cachina via Portezuelo de Mina Carola, *Johnston* 5672, December 14, 1925 (G.); common on gravelly or sandy soil, region about Aguado Cachina (waterhole in Quebrada Cachina ca. 6 km. inland from Caleta Esmeralda), *Johnston* 5737, December 14–15, 1925 (G., U. S., F. M.); dry sandy floor of quebrada about water-hole, vicinity of Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, *Johnston* 5822, December 16–18, 1925 (G.); Cachinal de la Costa, *Philippi,* December, 1853 (Santiago, type, photo. and fragment in G.). Prov. Atacama: Dept. Chañaral: on dry sandy slope ca. 1.5 km. above the caleta, vicinity of Caleta Pan de Azucar, *Johnston* 5833, December 18, 1925 (G.); sandy plain near sea, prostrate herb with white flowers, not common, vicinity of Puerto de Chañaral, hills back of El Barquito, *Johnston* 4754, October 28–29, 1925 (G., U. S.).

This species is similar to *S. stenocarpa* in leaves and stipules and in the repeatedly branching stems. Both have compound cymes and five stamens. The seeds of both species are of the same size and shape and in both have narrow, brown rims. The two species, however, differ in many ways. *S. denticulata* has usually shorter stems with shorter internodes, a compact instead of a loose cyme, capsule shorter than calyx instead of equalling or longer than the calyx, and shorter styles divided completely to the base. *S. denticulata* always has dull seeds; *S. stenocarpa* always has lustrous ones. Although *S. denticulata* nearly always has strongly mucronate sepals, occasionally the inner are blunt at the apex. Likewise *S. stenocarpa,* although it usually has blunt sepals, occasionally has the outer mucronate. Many more collections of these two species are needed, and perhaps cytological work as well, in order to understand thoroughly the significance of those plants with both types of sepals.

25. S. Cerviana (Cham. & Schlecht.) G. Don (Plate 594, figs. 4a–4d and map 21). Perennial: stems at least 14–17 cm. tall;[1] *internodes of stem below the inflorescence* 5–23 cm. long, 0.7–1.2 mm. in diameter: *leaves* fascicled, shortly mucronate, filiform, glabrous or shortly and sparsely pubescent, 13–35 mm. long, 0.6–0.8 mm. broad; *stipules* broadly lanceolate-acuminate, 2–6 mm. long: *inflorescence* a compound cyme, glabrous throughout or only shortly and sparsely pubescent, *usually crowded because of the many capsules and short internodes; internodes* slender, the lowest 1–21 mm. long, 0.4–0.6 mm. in diameter; *bracts* foliaceous, lacking or as much as 15 mm. long: *sepals* linear, *blunt-tipped, glabrous,* 2.6–4.5 mm. long; *petals* white, ovate, 2–4 mm. long, equal to or as much as 0.5 mm. shorter than the sepals; *stamens* 10; *styles* 3, separated to the base, 0.6–0.8 mm. long: *mature capsules* 3.2–4.2 mm. long, equal to or as much as 0.4 mm. shorter than or 0.8 mm. longer than the calyx; *fruiting pedicels* filiform, *not reflexed, glabrous,* the lowest 4–12 mm. long, 0.2 mm. in diameter: *seeds* 0.6–0.8 *mm. long, dark brown, pyriform, silvery, deeply sculptured in closely interwoven, vermiform pattern, covered with large, light brown, glandular papillae, sometimes dark brown and more rigid on the flat sides of the seed,* not winged.—Gen. Hist. Dichl. Pl. i. 426 (1831). *Arenaria Cerviana* Cham. & Schlecht. in Linnaea, i. 52 (1826). *Spergula Cerviana* (Cham. & Schlecht.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum purpureum* var. *firmum* Kindb. Mon. Lepig. 33, t. 3, fig. 21 (1863). *Spergularia firma* (Kindb.) Rohrb. in Linnaea, xxxvii. 231 (1871–73). *Spergularia polyantha* Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuev. Chil.) 765 (1892).—South America: grows only in south-central Chile. Chile: Prov. Curico: Dept. ?: ca. 1500 m. Hacienda Monte Grande, *Werdermann* 1671, December, 1924 (B., seeds immature). Prov. Nuble: Dept. Chillan: *Narcissus Briones,* 1887 (Santiago, photo. and fragment in G., type of *Arenaria polyantha* Philippi). Dept. Laja: in stony fields at Antuco, *Pöppig* 125, December (B., type of *Lepigonum purpureum* var. *firmum* Kindberg and marked by him in 1861); also *Pöppig* 804 (same collection, I think, Geneva, photo. in F. M.). Prov. Concepcion: Dept. Talcaguano: [Talcaguano, Feb. 13–Mar. 8, 1816],[2] *Chamisso* (B. type, marked *Arenaria Cerviana* N.). Dept. Lautaro: Coronel, *A. W. Hill* 42, December, 1902 (K., seeds immature).

There is great variation in comparative lengths of capsule and calyx, as is shown in the illustration. However, there are too few collections known for an understanding of the significance of this variation. At present it seems best to include all these plants under one species, especially since all fruiting plants have similar seeds.

26. S. floribunda (Gay) Rohrb. (Plate 594, figs. 5a–5e and map 22). Perennial with a heavy ligneous root as much as 5 mm. thick:

[1] Most of the collections are rootless.

[2] Locality and date found in Linnaea, i. 10 (1826).

caudex well developed, nodose, bearing 8–∞ diffuse stems 3–13 cm. long: *internodes of stem below the inflorescence* glandular-pubescent, 2.5–20 mm. long, 0.3–0.8 mm. in diameter: *leaves* filiform, mucronate, glabrous or glandular-pubescent, usually not fascicled or if so with only 1 leaf in the axil, 4–20 mm. long, 0.4–0.8 mm. broad; *stipules* broadly lanceolate, acuminate, 2–3.8 mm. long; *inflorescence a crowded cyme; internodes* usually too crowded to measure or 1–5 mm. long; *bracts* foliaceous, minute, 2–5 mm. long: *sepals* linear, with broad, scarious margins, sparsely glandular-pubescent especially toward the base, 2.8–5 mm. long; *petals* white, ovate, 2.4–3.8 mm. long, as much as 1.2–2 mm. shorter than the calyx; *stamens* 3–5; *styles* 3, divided to the base, 0.7–1 mm. long: *mature capsules spherical*, 2.4–3.8 mm. long, equal to or as much as 0.4–1.2 mm. shorter than the calyx: *fruiting pedicels* filiform, glandular-pubescent, 1.2–2 mm. long: *seeds* 0.4–0.7 *mm. long, black, pyriform, the surface sculptured in vermiform, areolar pattern and densely covered with short, coarse* (*sometimes partially rigid*) *brownish or blackish, glandular papillae*, not winged.—Linnaea, xxxvii. 230 (1871–73). *Arenaria floribunda* Gay,[1] Fl. Chile, i. 269 (1845). *Lepigonum floribundum* (Gay) Kindb. Synop. Lepig. 5 (1856). *L. depauperatum* **floribundum* (Gay) Kindb. Mon. Lepig. 26 (1863). *S. coquimbensis* Philippi in Anal. Univ. Chile, lxxxi. 763 (1893). *Tissa floribunda* (Gay) Reiche, Fl. Chile, i. 197 (1896).—South America: known only in coastal Chile in the province of Coquimbo. Chile: Prov. Coquimbo: Dept. La Serena: vicinity of La Serena, *Cl. Gay* (G., K., type collection);[2] Punta de Teatinos, La Serena, *Werdermann* 1542, November, 1925 (B.), in part only; Cerro Penascudo, *Barros* 255, September 13, 1928 (G.). Dept. Coquimbo: vicinity of Coquimbo, *Jaffuel* 2671, September, 1931 (G.); Coquimbo, *Jaffuel* 1289, November 3, 1930 (G.); Coquimbo, *Reed* (K.); "El Faro," Coquimbo, *Montero* 2833, September 16, 1936 (G.); Coquimbo, *Philippi* 1951, September, 1885 (Santiago, photo. and fragment in G., type of *S. coquimbensis* Philippi). Dept. Ovalle: Steppe bei Cerillos west Ovalle, *Otto Berninger* 638, September 19, 1925 (B.).

S. floribunda is quickly recognized by its crowded cyme, spherical capsules and small, black, densely papillose seeds. The type of *S. coquimbensis* Philippi is an exact match for specimens of the type collection of *Arenaria floribunda* Gay.

27. S. **pycnantha**, spec. nov. (tab. 594, fig. 6a–6c). Perennis: caudice ramoso, caulibus 2–6 diffusis interdum divisis, 6–20 cm.

[1] Gay must here be considered the author, instead of Naudin as is usually thought, because, as previously stated, there is no author cited at the end of "Cariophylleas," as there is after the "Elatineas," and no later publication that I have been able to find states that Naudin did the work on the *Caryophyllaceae*. This is decided also in spite of the fact that Gay credited Naudin with the authorship on the labels of the type collections.

[2] Type not seen but is supposedly in the Muséum National d'Histoire Naturelle at Paris.

longis; internodiis caulis partis efloriferae dense villoso-glandulosis, 6–25 mm. longis, 0.4–1.4 mm. crassis: foliis glabris vel villoso-glandulosis, breviter mucronatis, fasciculatis, 7–30 mm. longis, 0.6–1.4 mm. latis: stipulis conspicuis, lanceolatis acuminatis, apice laceratis, 5–7 mm. longis: cyma composita, villoso-glandulosa, propter internodium longum infra flores infimos alte supra reliquas partes plantae productа; internodiis infimis 1–15 mm. longis, 0.2–0.6 mm. crassis; bracteis foliosis 1.2–10 mm. longis: sepalis linearibus, margine late scariosis, villoso-glandulosis, 3.6–4.6 mm. longis; petalis albis, ovatis, 2.4–3 mm. longis, sepalis 0.6–1.6 mm. brevioribus; staminibus 2–5; stylis 3, 0.6–0.8 mm. longis: capsulis maturis 3.2–4.2 mm. longis, sepalis aequantibus vel eis 0.8 mm. brevioribus: pedicellis fructiferis filiformibus, villoso-glandulosis, haud reflexis, 2–7 mm. longis: seminibus 0.3–0.5 mm. longis, ferrugineis, lineis vermiformibus intertextis sculptis, fere laevibus vel tumulis prominentibus productis areolis, aliquando papillis parvis ferrugineis, haud alatis.—SOUTH AMERICA: coastal Chile, only in the provinces of Atacama and Coquimbo. CHILE: PROV. ATACAMA: Dept. Copaipó: Bandurrias, *Giesse* (B.); Desert of Atacama, *Giesse* 132, 1885–87 (N. Y., one plant only on the sheet, identical with the Bandurrias specimen); Vallenar, *Barros* 263, September 9, 1927 (G., not mature). Dept. Freirina: Huasco, *Jaffuel* 1164, November 2, 1930 (G., TYPE). PROV. COQUIMBO: Dept. La Serena: La Serena, *Claude-Joseph* 4461, October, 1926 (U. S.). Dept. Coquimbo: Guayacan, *Philippi*, November, 1864 (B.); Coquimbo, *Montero* 1850, September 26, 1934 (G.); Coquimbo, *Rose* 19316, October 11, 1914 (U. S., only part of sheet). Dept. Ovalle: Ovalle, *Claude-Joseph* 5197 & 5198, October, 1927 (U. S.). Dept. ?: Agosto, *Jaffuel* 3927, 1937 (G.). MAP 23.

28. S. CONFERTIFLORA Steud. (PLATE 594, FIGS. 8a–8c and MAP 24). Perennial with heavy root as much as 4 mm. in diameter; *caudex* elongate, bearing one to several *prostrate*, much branched stems 10–25 cm. long; *internodes below the inflorescence* glabrous or glandular-pubescent, 2–20 mm. long, 0.5–1.6 mm. in diameter; *leaves filiform, densely fascicled*, or with a small branch in the axil, shortly mucronate or abruptly acute, glabrous or sparsely glandular-pubescent, 7–30 mm. long, 0.3–0.7 mm. wide; *stipules* lanceolate-acuminate, 3.2–6 mm. long: *inflorescence* a loose, many-flowered cyme; *internodes* filiform, glandular-pubescent, the lowest 2–16 mm. long, 0.2–0.5 mm. in diameter; *bracts* small, becoming minute above, glandular-pubescent, 1–7 mm. long: *sepals* linear, glandular-pubescent, 4.8–6.2 mm. long; *petals* white, ovate, 3–5.6 mm. long, as much as 1.2–2.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base, 0.4–0.6 mm. long: *mature capsules slender*, 4–6 mm. long, equal to or as much as 0.8 mm. shorter than the calyx: *fruiting pedicels* erect, filiform, glandular-pubescent, the lowest 3–7 mm. long: *seeds* 0.6–0.7 mm. long, *brown, rounded in outline, obscurely sculptured in interwoven, vermiform pattern, covered with papillae which may be round or elongate and slightly curved*,[1] not

[1] Some seeds may have both kinds of papillae, others have entirely elongate ones.

winged.—Flora, 425 (1856); Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuevas Chile) 768 (1892); Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Arenaria rubra* sensu Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832), in part, including Juan Fernandez (spec. *Bertero*), excluding Valparaiso (*Bridges*), which is *S. villosa*,[1] non L. (1753). *Arenaria rubra* var. *polyphylla* Philippi in Bot. Zeitung, xiv. 642 (1856) (at least in part because of an annotated *Philippi* collection (K.) from Juan Fernandez but probably not as to Rancagua plants[2]). *S. campestris* 2. forma multicaulis stricta, etc. Rohrb. in Linnaea, xxxvii. 230 (1871–1873). *S. polyphylla* (Philippi) Rohrb. l. c. 232 (1871–73). *S. confertiflora* var. *polyphylla* (Philippi) Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Tissa polyphylla* (Philippi) Reiche, Fl. Chile i. 197 (1896). *S. rubra* sensu Johow, Estud. Fl. Juan Fernandez, 118 (1896), non *Arenaria rubra* L. (1753). —South America: only on the Juan Fernandez Islands. Chile: Juan Fernandez Islands: on sea cliffs, *Bertero* 1431, March, 1830 (K., type collection);[3] Juan Fernandez, *Philippi*, 1861 (K., marked *polyphylla* in same manner as other Philippi labels, type collection of *Arenaria rubra* var. *polyphylla* Philippi?); Juan Fernandez, *Moseley* (Challenger Exped.), November, 1875 (K.); Juan Fernandez, *Hooker f.* (N. Y.); Masatierra, Punta San Carlos, *C. & I. Skottsberg* 123, January 9, 1917 (N. Y., marked *Spergularia confertiflora* Steud. by Skottsberg); Masatierra, Bahia de Padre, *C. & I. Skottsberg* 296 (U. S.).

This species is apparently endemic in the Juan Fernandez Islands. Many more collections are needed thoroughly to understand its variations and to determine whether there is any foundation for the reports of its occurrence on the mainland of Chile.

29. S. villosa (Pers.) Camb. (Plate 594, figs. 7a–7d and map 25). *Perennial* with a heavy ligneous central root; *caudex* well developed, branched, bearing 2–many, usually many, diffuse stems 9–30 cm. long; *internodes of stem below the inflorescence* usually glandular-pubescent, sometimes glabrous below, but always pubescent above, 3–40 mm. long, 0.4–1.7 mm. wide: *leaves* fascicled, filiform, mucronate, 10–40 mm. long, 0.3–1.2 mm. broad, usually glandular-pubescent; *stipules* broadly lanceolate, acuminate, occasionally, when small, deltoid, 2–8 mm. long: *inflorescence* a lax, many-flowered cyme, always glandular-pubescent, the *lowest internodes* 5–35 mm. long, 0.2–0.8 mm. in diameter; *bracts* usually minute, 1–7 mm. long, occasionally foliaceous, 8–15 mm. long: *sepals* linear-lanceolate, glandular-pubescent, 2.8–5.2 mm. long; *petals* white, ovate, 2.6–5 mm. long, usually 0.6–1.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base,

[1] The remaining collections cited were not seen by the author.

[2] Rancagua is on the mainland of Chile, whence the author has seen no collections of this species.

[3] Is the type at Paris? Flora, 402 (1856) note!

0.4–0.6 mm. long: *mature capsules* 4–6.5 mm., usually 5–6 mm. long, and 0.3–1.8 mm., usually 0.8–1.8 mm. *longer than calyx: fruiting pedicels* filiform, always glandular-pubescent, usually reflexed, though sometimes erect, the lowest 5–18 mm. long: *seeds* 0.4–0.65 mm., usually 0.5–0.6 mm. long, *dark brown, almost black, pyriform, with small black papillae in regular pattern or smooth, occasionally with small raised places in the same pattern as the papillae, covered with very delicate, vermiform traceries in areolar pattern*, with or without a scarious, white, *erose wing* 0.1–0.2 mm. wide, often with a brown zone next to the seed.—In St. Hilaire, Fl. Bras. ii. 178 (1829); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 93 (1901) in part (including references to *Spergula villosa* Pers. and *Lepigonum trachyspermum* Kindb. and localities given, excluding the description and reference to *S. villosa α. genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. lxi, fig. 1 (1872), which apply to *S. ramosa* and *S. rupestris*, *q. v.*); Buchtien, Contrib. Fl. Bolivia, pt. i. iii. (1910) (as to source of name but not as to plant cited, La Paz 448, which is *S. pazensis*); Macbride, Field Mus. Pub. Bot. xiii. (Fl. Peru) pt. ii. no. 2, 633 (1937) (as to source of name but not as to plants described, because of "seeds yellow," and excluding reference, Mart. Fl. Bras. xiv. pt. 2, pl. 61, both of which probably apply to *S. ramosa, q. v.*). *Spergula villosa* Pers. Synop. i. 522 (1805); Steud. Nom. Bot. ed. 2, ii. 617 (1841). *Arenaria media* sensu Hooker & Arnott in Hooker, Bot. Misc. iii. 147 (1832), in part (including the collections from Valparaiso of *Cruickshanks* and *Cuming* 550, excluding collections Buenos Aires (*Gillies*) and Valparaiso (*Bridges*) both of which are *S. media*), non L. (1762); sensu Gay, Fl. Chile i. 267 (1845) (because a specimen collected by *Gay* in Chile is labeled *A. media* by him and is actually *S. villosa*), non L. (1762). *Lepigonum villosum* Fisch. & Mey. Ind. Sem. Hort. Petrop. iv. 15 (1837), *nomen nudum*. *L. villosum* (Pers.) Kindb. Synop. Lepig. 16 (1856). *L. glandulosum* Liebm. Ind. Sem. H. Haun. 21 (1853), not Kindb. Mon. Lepig. 16 (1863) (which is based upon an entirely different African plant, *Arenaria glandulosa* Jacquin, Hort. Schoenb. iii. 56, pl. 355 (1798). *Arenaria Berteroana* Philippi in Linnaea, xxviii. 673 (1856). *Spergularia remotiflora* Steud. in Flora, 425 (1856), probably synonymous, according to description (the collection cited, *Bertero* 811, was not seen by me); Philippi in Anal. Univ. Chile, lxxxi. 768 (1892). *S. rupestris* sensu Steud. in Flora, 424 (1856) (because the cited specimens, *Bertero* 810 & 58, are *S. villosa*) non Camb. (1829); sensu Philippi in Anal. Univ. Chile, lxxxi. 771 (1892), for same reasons as above, non Camb. (1829). *Lepigonum Liebmannianum* Lange, Ind. Sem. H. Haun. 2 (1859); Kindb. Mon. Lepig. 27 (1863). *L. arenarium* Kindb. Synop. Lepig. 13 (1856) (because he cites *Arenaria media* Gay and the Coquimbo, *Gay*, collection which is probably *S. villosa*—see citations); Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863); including the references, *S. villosa* Camb. and *A. media* Gay, and the collections, Coquimbo, Chile, *Gay*, probably, and

Talcahuano, *Pöppig*, and the left-hand plant and the seed with the erose-margined wing; and excluding the references, *S. grandis* Camb., *S. ramosa* Camb., *A. grandis* HBK. & DC., and the remainder of the figure and specimens cited, all of which apply to *S. grandis* and *S. ramosa*, *q. v.*). *L. arenarium* Kindb. var. *depressa* Kindb. Mon. Lepig. 17, t. i, fig. 4 (1863). *L. macrorhizum* (Réq.) Kindb. var. "seminibus alatis floribus paulo minoribus," Kindb. Mon. Lepig. 22 (1863) (because coll. by *Pöppig*, Chile ad Concon, is *S. villosa*). *L. trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including the references, *S. villosa* Camb. and *Spergula villosa* Pers., and the collection, *Bertero*, Chile (B.) (cf. under citations); and excluding the citations, Montevideo, *Sello* and Maldonado, *Camb. & St. Hil.*, which are *S. ramosa* and *S. rupestris*, and the fig. 16, which is *S. ramosa*). *Spergularia campestris* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 267 (1872), in part (including, probably, citation, Montevideo, *Sello*,[1] and the reference, *S. remotiflora* Steud.; excluding European plants which are probably *S. rubra*), non *Arenaria rubra* var. *campestris* L. (1753); sensu Rohrb. in Linnaea, xxxvii. 229 (1871–73), probably in part (including "Forma diffusior inflorescentia laxiore pauciflora," etc. and reference, *S. remotiflora* Steud., though neither collection cited has been seen by the author; excluding "Forma multicaulis . . ."), non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia marina* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 273 (1872), in small part (including only at least one of the Montevideo, *Sello*, specimens (see citations) and the reference *Lepigonum rupestre* Kindb. only as to the *Sello* plants), non *Arenaria rubra* var. *marina* L. (1753). *S. villosa* α. *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872), in part (including the references, *Spergula villosa* Pers., *Spergularia villosa* (Pers.) Camb., and *Lepigonum trachyspermum* Kindb. in part; and excluding *Lepigonum murale* Kindb. and the entire figure, which are *S. ramosa* and *S. rupestris*, *q. v.*); Rohrb. in Linnaea, xxxvii. 238 (1871–73), in part, for the same reasons as above. *S. villosa* var. β. *Berteroana* (Philippi) Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872);[2] Rohrb. in Linnaea, xxxvii. 239 (1871–73); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 94 (1901). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 271 (1872), in part (including the synonyms, *A. media* Gay and *L. arenarium* Kindb., and excluding the synonyms, *S. ramosa* Camb. and *Spergula racemosa* Dietr., which belong with *S. ramosa*); Rohrb. in Linnaea, xxxvii. 243 (1871–73), at least in part, for the same reasons as above. *S. Liebmanniana* (Lange) Rohrb. in Linnaea, xxxvii. 242 (1871–73). *S. media*, 3. "Forma dense caespitosa humilis capsula calyce breviore," Rohrb. in Linnaea, xxxvii. 243 (1871–73).[3] *Tissa villosa* (Pers.) Britt. in Bull. Torr. Bot. Club, xvi.

[1] Although no specimens were found by the author annotated in this manner by Rohrbach.

[2] The collection, "prope Vicuña, *Cl. Gay*," however, was not seen by the author.

[3] This form cannot possibly have any relationship with *Spergularia media* (L.) Griseb. under which he puts it.

62 (1889), as to source of name but not as to plants cited which are *S. pazensis, q. v.;* Britt. l. c. 129 (1889), excluding the Andean plants which are probably *S. pazensis. T. Clevelandi* Greene, Fl. Francisc. 127 (1891); Jepson, Fl. W. Mid. Calif. 170 (1901); Greene, Man. Bot. San Francisc. Bay, 36 (1894). *T. grandis* sensu Morong & Britt., in Ann. N. Y. Acad. Sci. vii. (Enum. of Pl. coll. by Morong in Paraguay) 53 (1892), in part (including citation, Buenos Aires, *Morong* 3, but excluding *Morong* 921 which is *Spergularia ramosa* var. *diffusa*), non *Spergula grandis* Pers. (1805). *Spergularia aprica* Philippi in Anal. Univ. Chile, lxxxii. 766 (1893). *Tissa rubra* sensu K. Brandegee in Zoe, iv. 84 (1893), non *Arenaria rubra* L. (1753). *S. Clevelandi* (Greene) Robins. in Proc. Am. Acad. xxix. 310 (1894) and in Gray, Synop. Fl. i. pt. i. 251 (1897); Jepson, Fl. Calif. pt. v. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Man. So. Calif. Bot. 163 (1935). *Tissa glandulosa* (Liebm.) Reiche, Fl. Chile, i. 196 (1896). *T. media* var. *Berteroana* (Philippi) Reiche, l. c. 201 (1896). *Buda campestris* sensu Kuntze, Rev. Gen. iii. pt. ii, 13 (1898), in part at least (including citation, Chile, *Maule*)[1] non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia rubra* sensu Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 91 (1901), non *Arenaria rubra* L. (1753). *Tissa argillosa* Greene ex C. F. Baker, West. Am. Plants, ii. 18 (1903), *nomen solum. Alsine Clevelandi* (Greene) House in Am. Midl. Nat. vii. 134 (1921).—South America, and introduced in North America: common in southern Chile and probably introduced in Uruguay around Montevideo and in the Argentine at Buenos Aires and La Plata, and also introduced in California about cities from San Diego north to San Francisco, and near Portland, Oregon. Chile: Prov. Coquimbo: Dept. La Serena: Punta de Teatinas (alt. ca. 10 m.), *Werdermann* 1542, October, 1925 (B.). Prov. Aconcagua: in stony pastures on hills and on river banks, Quillota, *Bertero* 810, October–November, 1829 (N. Y.,[2] F. M., Leiden, immature); on roadsides, Valparaiso, *Buchtien*, December 8, 1895 (U. S., G.); Valparaiso, *Meyen*, 1831 (B., 2 sheets, one marked by Kindb. 1861,[3] but with a combination which he never published); Valparaiso, *Claude-Joseph* 3619, October, 1925 (U. S.); Valparaiso, *Wilkes Exped.* (G., U. S., no seeds and puny specimens but probably *S. villosa*); Valparaiso, *Bridges*, 1830 (K., seeds unusually small, 0.45 mm. long); near Valparaiso, *Cuming* 550, 1831 (K.);[4] Quebrada las Zarras que domina Valparaiso, *Jaffuel* 637, November, 1910 (G.); Valle de Marga-Marga, 40 km. east of Valparaiso, *Jaffuel* 639, October, 1910 (G., immature); Quintero (La Ventana), *Marta H. Looser* 3374, February, 1936 (G.); Pangal Limache, *Gualterio Looser*, October 12, 1926 (G.); Quebrada del Lúcumo (alt. 10 m.), *G. Looser*, February 28, 1937 (G.). Prov.

[1] The collection, Villa Florida, Paraguay, *Kuntze*, not seen by author.

[2] Cited under *Spergularia rupestris* Steudel, in Flora, 424 (1856).

[3] Cited under *L. arenarium* var. *depressa* by Kindberg, Mon. Lepig. 17 (1863).

[4] Cited under *Arenaria media* by Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832).

Santiago: San Antonio, *Asplund* 4301, July 23, 1921 (B., immature); Santiago, *R. A. Philippi* (U. S.);[1] Santiago, *Claude-Joseph* 756, January, 1919 (U. S.); Santiago, *E. E. Gigoux*, December, 1909 (G., immature); Cerro Blanco, vicinity of Santiago, *G. T. Hastings* 165, November 16, 1900 (U. S., U. C., N. Y.); Penaflor, Cerro Manuel Rodriquez, 500 m., *G. Looser* 3730, October 2, 1938 (D. S.); same locality and date, in hot sunny places in very hard soil, *G. Looser* 3731 (D. S., prostrate, matted plant with short internodes and leaves and small seeds); Mercedes, *Philippi*, November, 1888 (Santiago, photo. and fragment in G.). Prov. Colchagua: *Phillippi* dedit 1876 (B.,[2] nearly mature); Rancagua, *Bertero* (Santiago, photo. in G., type of *Arenaria Berteroana*);[3] *Bertero* 59 (Leiden), but locality should be "pascuis sterilibus montis La Leona," Rancagua;[4] Curico, *Claude-Joseph* 5204, January 1928 (U. S., unusually small seeds, only 0.4–0.5 mm. long); Potrero Grande, Curico, *Barros* 252, January 19, 1927 (G.). Prov. Talca: Curepto, *Claude-Joseph* 3875, January, 1926 (U. S.); Ilico, coast of Prov. Talca, *Barros* 272, October 18, 1938 (G.). Prov. Maule: Constitucion, *Claude-Joseph* 2075, December, 1922 (U. S., immature); Maule, *Kuntze*, February 8, 1892 (N. Y., no seeds, marked *Buda rubra* (L.) Dum. by Otto Kuntze).[5] Prov. Concepcion: Concepcion, *Claude-Joseph* 4067, November, 1925 (U. S.); vicinity of Concepcion, *Jaffuel* 2992, December, 1931 (G.); Yumbel, *Claude-Joseph* 5697, January, 1928 (U. S.); Talcaguano, *Chamisso*, 1816 (B., marked by Kindberg but with a name which he never published);[6] in sandy and clay pastures near Concepcion, *Poeppig* 131 (B., Leiden; Berlin specimen marked *Lepigonum macrorhizum* (Réq.) by Kindberg 1861,[7] and *Spergularia marina* (L.), forma calyce capsulam aequante by Rohrbach). Prov. Arauco: sandy knolls in salt marsh, Arauco, *Pennell* 12933, March 6, 1925 (G., F. M.); Arauco, *Barros* 284, November 15, 1938 (G.); Peumo, *Claude-Joseph* 1436, September 20, 1921 (U. S.). Prov. Valdivia: *E. Reed* (K.). Chile, no locality: mittleres Chile, *Claude-Joseph*, November 19, 1922 (B. 2 sheets); Chile, "*Bertero* misit" 1830 (B., immature, marked *Lepigonum villosum* by Kindberg 1861[8] and *Spergularia remotiflora* Steud. ("in sabulosis secus torrentes Valparaiso, Chile, *Bertero*") by Rohrbach); Chile, *Cl. Gay* (B., marked *Arenaria* (*Lepigonum*) *media* by Gay, Fl. Chil.);[9] Chile, *Bridges* (B., marked *Lepigonum arenarium* by Kindberg,

[1] Marked *Arenaria media* L. in same hand as Santiago—label has slit in it, as though it was coll. label, probably Philippi's handwriting.

[2] Marked *Arenaria media* L. but in a different hand from above.

[3] Philippi in Linnaea, xxviii. 673 (1856).

[4] According to Rohrb. in Linnaea, xxxvii. 239 (1871–73).

[5] Cited under *Buda campestris* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[6] Cited under *Lepigonum arenarium* var. *depressum* by Kindberg, Mon. Lepig. 17 (1863).

[7] Cited as a var. of *L. macrorhizum* with winged seeds and flowers a little smaller by Kindberg, Mon. Lepig. 22 (1863).

[8] Cited under *Lepigonum trachyspermum* by Kindb. Mon. Lepig. 31 (1863).

[9] Probably the Gay spec. cited under *L. arenarium* by Kindb. Mon. Lepig. 17 (1863).

1861); Chile, *Bertero* 58 (G.);[1] Chile, *Bertero* (H. B. 32) (B.); Chile, *Cruickshanks* (K.,[2] mounted on a sheet with *Arenaria media* in Herb. Hooker); Chile, *Bertero* 1431 (Leiden). BRAZIL: "Campos da Bocaina, Sao Paulo 19401 . . . Nov. C."[3], *Glaziou* 19401, 1891–92 (B.). URUGUAY: DEPT. MONTEVIDEO: Sayago, *Herter* 10445, fl. October, 1907–10 (B.); Montevideo, *Arsène-Isabelle* 1838 (K., from Herb. J. Gay, immature); Montevideo, *Sello* 207 (B. 2 sheets, one marked *Spergularia salina* by Rohrbach and the other "*Spergularia marina*, forma capsula vix exserta (sp. *rupestris* Camb.)" by Rohrbach); Montevideo, *Commerson* "(sans nom.)" (Paris, Herb. Jussieu no. 13058, TYPE probably, photo. in G.,[4] immature but flowering); Montevideo, *Commerson* (B. ex Museo Paris 1820, immature, probably type collection); Buenos Ayres and Monte Video, *Commerson* (N. Y., type collection?). ARGENTINA: PROV. SAN JUAN: *R. Roldan Z.*, November 1, 1912 (La Plata). PROV. ENTRE RIOS: Concepcion del Uruguay, *Lorentz*, October, 1875 (B.); Delta del Paraná, arroyo Negro, *Cabrera* 1979, November 24, 1931 (B., La Plata, unusually small seeds, 0.45 mm. long). PROV. SANTA FE: *Cristie* 94 (K.). PROV. BUENOS AIRES: abundant in saline meadows, Avellaneda, *Parodi* 9877, October 10, 1931 (G., immature); low saline places about the Rio Paraná, Campana F. C. C. A., *Burkart* 5664, November 5, 1933 (B., 2 sheets); in saline places, Campana, *Parodi* 8608, October 27, 1928 (G., B.); Buenos Aires, *Morong* 3, 1888–1890 (N. Y.);[5] rich meadows between La Plata and Ensenada, *Cabrera* 1776, October 9, 1931 (G., F. M., immature); Camina (Rio de la Plata), *Cabrera* 2897, October, 1934 (La (La Plata); Bosque, La Plata, *Cabrera* 3272, October 29, 1934 (La Plata); La Plata, *E. L. Ekman* 1876, October 20, 1907 (U. S., N. Y.); Belgrano, Saavedra and Palermo, *Bettfreund & Koester* 275, 1888 (B., immature); saline fields, Part. Ayul, Estancia Salaberry, *Osten* (B.). NORTH AMERICA: MEXICO: LOWER CALIFORNIA: east slope Coronado Is., *R. B. Cowles* 8, March 29, 1921 (Pam.). CALIFORNIA: San Diego Co.: San Diego, *Cleveland* 526, 1877 (G., marked *S. Clevelandi* by Robinson[6] and *Tissa villosa* by Britton);[6] San Diego, *K. Brandegee*, about 1891 (G., marked *S. Clevelandi* by Robinson);[7] common about dwellings, San Diego, *Brandegee* 3373, April 27, 1903

[1] Cited under *Spergularia villosa* var. *Berteroana* by Rohrb. in Fl. Bras. xiv. pt. ii. 269 (1872) and under *S. rupestris* by Steud. in Flora, 424 (1856).

[2] Cited under *Arenaria media* in Hook. Bot. Misc. iii. 147 (1832).

[3] Locality obtained from Bull. Soc. Bot. France lii. Mém. 3: 35 (1905), where there is a list of plants of central Brazil by *Glaziou*, also his itinerary in Brazil.

[4] Has a tag pasted on top of label which says *Spergula villosa* Poir. Encycl. & Pers. Synops. i. This probably was not put on the sheet at time of naming by Persoon. The specimen, therefore, was probably not annotated by Persoon.

[5] Cited under *Tissa grandis* by Morong & Britt. in Enum. of Pl. Coll. Morong in Paraguay, 53 (1892) in Ann. N. Y. Acad. Sci. vii. 53 (1892).

[6] Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894); also cited under *Tissa villosa* by Britt. in Bull. Torr. Club, xvi. 129 (1889) and designated the type of *Tissa Clevelandi* Greene by Jepson, Fl. Calif. v. 494 (1914).

[7] Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894).

(G., U. S., Cal. Acad., U. C., Pom., D. S., Notre Dame); National City, *Abrams* 3525, May 18, 1903 (G., U. S., U. C., D. S., Pom.); 1 mile sw. of Otay, on road to Tijuana (Lower Sonoran), *C. B. Wolf* 2088, May 26, 1931 (Cal. Acad., D. S., Pom.). Orange Co.: damp ground, Newport Bay, *L. M. Booth*, 1089, May 24, 1932 (U. C., Pom.). Los Angeles Co.: well established at side of path, Claremont, *I. M. Johnston* 1976, April 25, 1918 (U. S., D. S., Pom.). Santa Barbara Co.: along the streets, near Santa Barbara, *Eastwood* 207, May, 1908 (U. S.); Santa Barbara, *Wooton* 1912 (U. S.). Monterey Co.: Camphora, *Eastwood & Howell* 2186, May 5, 1936 (G., Cal. Acad.). Santa Clara Co.: San Jose, *Mrs. E. A. Bush* 1880 (U. S.); clay ridges in foothills near Stanford Univ., *C. F. Baker* 666, May 27, 1903 (G., U. S., Cal. Acad., Pom., U. C., Notre Dame, distributed as *Tissa argillosa* Greene). San Francisco Co.: Mission Hills, San Francisco, *Michener*, June, 1893 (G., D. S.); San Francisco, *Jepson*, May 20, 1891 (G.); Presidio, San Francisco, *Greene*, May 27, 1893 (U. C.); Presidio, San Francisco, *Heller* 5699, June 12, 1902 (G., D. S., Pom., U. S.); Laurel Hill Cemetery, San Francisco, *Eastwood* 235, June 7, 1912 (G., U. S., Cal. Acad.). Solano Co.: Benicia, *Eastwood* 10509, May 15, 1921 (Cal. Acad.). El Dorado Co.: New York Ravine, *K. Brandegee*, May 8, 1907 (U. C.). San Diego Co.: roadsides, old clearing, La Jolla, *F. E. & E. S. Clements* 48, April 7, 1914 (G., U. C.). Oregon: Multnomah Co.: Lower Albina, *E. P. Sheldon*, July 21, 1902 (Ore.).

No specimen has been located labeled "rather sandy uplands about San Diego," as the type of *Tissa Clevelandi* Greene should be. There is a collection made in San Diego, *Cleveland* 526 (1877), which probably is the one cited by Greene. This collection was later designated as the type of Greene's species by Jepson. In the Greene herbarium at Notre Dame there is a specimen collected by *T. S. Brandegee* in San Diego, April 27, 1903, which was labeled by him and marked typical. There is another of the same collection, marked not typical, which differs only in being more matted and with the leaves growing in every direction. Furthermore, no specimen has been found labeled "gravelly knolls at the Presidio, San Francisco." However, a collection made and labeled by Greene in 1893 from this locality indicates what the plant probably was. All the plants mentioned in the description are alike in all diagnostic characters and to my mind are identical with the South American plants cited above.

Since on the Pacific Coast of North America the plant always occurs around cities or other habitations, one concludes that it was introduced from South America. It has been collected only from the vicinity of the large cities of Montevideo, Uruguay and Buenos Aires and La Plata, Argentina, while it seems very common in south-central

Chile. *One is inclined to think, then, that Chile is its native habitat,* though further work by botanists in South America is needed before this surmise can be verified.

This species shows great variation in habit, from robust sprawling plants to short, delicate, matted ones. These occur sporadically throughout the range, due seemingly to ecological conditions (see *G. Looser* 3730 and 3731, Penafor, Cerro Manuel Rodriguez, examples of both extremes from the same place). Plants with extremely small seeds, 0.4 mm. long, occur sporadically throughout the range and may have small or large capsules. Plants with papillose seeds occur just as often as those with them non-papillose and in the same geographic range.

30. S. COLLINA I. M. Johnst. (PLATE 595, FIGS. 4a–4c). *Annual with open dichotomous branching:* diffuse *stems* 1–5 from the base, 5–25 cm. long; *internodes* below the inflorescence few, 7–35 mm. long, 0.5–1.5 mm. in diameter: *leaves not fascicled,* fleshy, sparsely glandular-pubescent, mucronate, 6–18 mm. long, 1–2 mm. broad; *stipules* inconspicuous, *deltoid,* attenuate, 1.2–2 mm. long: *inflorescence a widely angled leafy cyme,* not sharply differentiated from vegetative parts, with elongated internodes, 1–3 cm. long; *bracts* foliaceous, 0.3–1.5 mm. long: *sepals* ovate-lanceolate, glandular-pubescent, 3.7–4.5 mm. long; *petals* white, ovate, 3.5–5 mm., usually equalling the calyx; *stamens* 10; *styles* 3, separating to the base as flower matures, 0.8–1.2 mm. long: *mature capsules* stipitate, 4–5.5 mm. long, exceeding the calyx by 0.3–1 mm.: *fruiting pedicels* filiform, strongly reflexed, the lower 8–22 mm. long: *seeds* 0.6–0.8 mm. long, *black, rounded at the summit, deeply sculptured in vermiform pattern with crowded, long, black papillae,* not winged.—Contrib. Gray Herb. lxxxi. 89 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru Pt. 2, no. 2, 630 (1937). *Drymaria molluginea* sensu Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911), non *Alsine molluginea* Lagasca (1815).—SOUTH AMERICA: open sandy hills on coast of Peru in Dept. Arequipa. PROV. ISLAY: DEPT. AREQUIPA: lower edge of green belt on desert hills in back of port, Mollendo, *Johnston* 3568, October 16, 1925 (G. TYPE, F. M.); after October rains, Mollendo, *A. S. Hitchcock* 22355, November 17, 1923 (U. S.); Atico, *Raimondi* 11609, November, 1863 (B.). MAP 11.

This plant was illustrated by Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911) but erroneously called *Drymaria molluginea* Didr. The latter name refers to a Mexican plant with bifid petals and has its source from plants grown in the Hortus Regius, Madrid, from seeds collected by *Sessé and Mocino* in "Nova Hispania." Lagasca called it *Alsine molluginea*[1] (photo. and drawings of

[1] Lagasca, Gen. et Spec. 13, no. 170 (1815).

seeds and stipules in Gray Herb.) but it later became *Drymaria molluginea* (Lag.) Didr.[1]

31. S. **Spruceana**, spec. nov. (TAB. 595, FIG. 2a–2c). Perennis: radice centrale ad 1 cm. crassa: caudice ramoso vel simplice, caulibus multis gracilibus diffusis, 3–30 cm. longis; internodiis caulis partis efloriferi gracilibus, 0.8–1.5 mm. crassis, 3–43 mm. longis: foliis plerumque fasciculatis linearibus complanatis mucronatis margine villoso-glanduloso excepto glabris, 3–45 mm. longis, 0.5–1 mm. latis: stipulis scariosis albidis triangulari-acuminatis, 3–6 mm. longis, basi vel paullo supra basin connatis: floribus in cymam contractam dispositis; bracteis infimis longis foliosis, ad 15 mm. longis supremis minimis vel obsoletis; internodiis saepe sparse villoso-glandulosis, inferioribus 6–15 mm., superioribus brevissimis, 1.5–3 mm. longis: sepalis lanceolatis, glabris, plerumque glandulis minutis pallidis puncticulatis praecipue in parte superiore, margine scariosis, recurvatis, apice incurvato saepe cucullato, 3.2–4.8 mm. longis; petalis albis ovatis, 2–2.5 mm. longis; staminibus 10; stylis 3, ad basim divisis: capsulis maturis 3–4.5 mm. longis, sepala aequantibus vel eis 0.1–0.5 mm. brevioribus: pedicellis fructiferis haud reflexis, infimis, 2–5 mm. longis: seminibus pallide brunneis lucidis, lineis vermiformibus intertextis sculptis, saepe verrucis minutis elongatis haud papillatis, exalatis, vel saepe appendice parva scariosa ornatis, 0.5–0.6 mm. longis.—SOUTH AMERICA: found only in the high Andes of Ecuador. ECUADOR: 9937 ft., Quito, Prov. Pichincha, *Jameson* (K.); vicinity of Quito, Latacunga or Ambata in sandy places, *Sodiro* 123 (B.); Quitensian Andes, *Couthouy*, 1855 (G., N. Y.); Tixan, Prov. Chimborazo, *Rose* 22403, August 27, 1918 (G., U. S.); open ground Urbina, paramo on east flank of Mt. Chimborazo, Prov. Chimborazo, alt. 3600 m., *A. S. Hitchcock* 22039, October 5, 1923 (U. S.); in Andibus Ecuadorensibus, *R. Spruce* 5444, 1857–9 (G. TYPE, K., B., F. M.). MAP 26.

The name *Spruceana* was suggested to me by an unpublished note of Britton's on the *Spruce* collection in the Gray Herbarium. It is a pleasure to name it after RICHARD SPRUCE, a courageous explorer and an accurate observer.

32. S. **colombiana**, spec. nov. (TAB. 596, FIG. 4a et 4b). Perennis vel annua?: caulibus saltem 12–25 mm. longis, multi-ramosis: internodiis caulis partis efloriferi glabris, 6–20 mm. longis, 0.4–1.2 mm. crassis: foliis paululum fasciculatis, 1–2 foliis axillaribus, mucronatis, glabris, 15–20 mm. longis, 0.6–0.8 mm. latis; stipulis late lanceolato-acuminatis, 4.5–5.5 mm. longis: floribus in cymam laxam ramosam dispositis; internodiis infimis 7–15 mm. longis, 0.4–0.6 mm. crassis; bracteis foliosis, supremis minimis: sepalis linearibus, sparse villoso-glandulosis, 4.2–5.6 mm. longis; petalis albis, ovatis, 2.8–4 mm. longis, sepalis 1.6 mm. brevioribus; staminibus 5–10; stylis 3, ad basim

[1] Didr. in Linnaea, xxix. 738 (1859).

divisis, 0.6 mm. longis: capsulis pene maturis, 5–5.2 mm. longis sepalis aequantibus vel eis 1 mm. longioribus pedicellis fructiferis filiformibus, villoso-glandulosis, patentibus, 5–7 mm. longis: seminibus immaturis, lineis vermiformibus intertextis sculptis, alatis, ala albida, scariosa, 0.2 mm. lata.—SOUTH AMERICA: known as yet only from Bogota, Colombia. COLOMBIA: PROV. BOGOTA: Cordillera de Bogota, 27 m. alt., New Granada, *J. Triana*, 1851–1857 (K. TYPE, N. Y.); *Linden* 178 (K.). MAP 27.

33. S. PLATENSIS (St. Hil. & Adr. Juss.) Fenzl (PLATE 595, FIGS. 3a–3d and MAP 28). Annual: *caudex* bearing 3–many diffuse stems, usually many, 5–30 cm. long; *internodes of stem below the inflorescence* usually many, 5–30 cm. long; *leaves* glabrous, slender, 8–40 mm. long, 0.4–1.4 mm. in diameter: *leaves* filiform, glabrous, mucronate, usually not fascicled or, if so, with only 1–2 leaves at the axils, 10–40 mm. long, 0.4–1.2 mm. broad; *stipules* *deltoid*, acuminate, as long as broad or slightly longer than broad, 1.5–3.5 mm. long: *inflorescence a much compounded cyme, glabrous throughout; internodes* 3–28 mm., usually 7–15 mm. long; *bracts* usually minute, 0.5–10 mm., usually 0.5–4 mm. long: *sepals broadly* *lanceolate, bluntly tipped*, 0.8–1.6 mm. long; *petals* minute, white, narrowly ovate, 0.6–1 mm. long, as much as 0.4–1 mm. shorter than the calyx; *stamens* 5; *styles* 3, erect when young, separated nearly to the base, 0.3–0.4 mm. long: *mature capsules* 1.4–2.6 mm., usually 1.8–2.2 mm. long, as much as 0.4–1 mm., usually 0.6–0.8 mm. longer than the calyx: *fruiting pedicels* filiform, never reflexed, the lowest 2–8 mm., usually 4–6 mm. long, the upper ones very short: *seeds* 0.35–0.4 mm. long, *light or reddish brown, often with a silvery tinge, often angular because of compression in the capsule, deeply sculptured in interwoven vermiform pattern, usually covered with large, brown, glandular, often cup-shaped papillae*, not winged.—Ann. Wien. Mus. ii. 272, in note (1839); Rohrb. in Mart. Fl. Bras. xiv. ii. 267, pl. 61, fig. 2 (1872); Rohrb. in Linnaea, xxxvii. 228 (1871–73); Robins. in Gray, Synop. Fl. i. 251 (1897); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 93 (1901); Jepson, Fl. Calif. 495 (1914) and Man. Fl. Pl. Calif. 361 (1923); Munz, Fl. So. Calif. 163 (1935). *Balardia platensis* St. Hil. & Adr. Juss. in St. Hil. Fl. Bras. Mer. ii. 181, pl. 111 (1829); C. Gay, Fl. Chile, ii. 524 (1846). *Lepigonum gracile* Wats. in Proc. Am. Acad. xvii. 367 (1882). *Tissa gracilis* (Wats.) Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889); Small, Fl. Se. U. S. 418 (1903). *Buda platensis* (St. Hil. & Adr. Juss.) Kuntze, Rev. Gen. i. 50 (1891). *Spergularia angolensis* Philippi in Anal. Univ. Chile, lxxxi. 771 (1892). *S. gracilis* (Wats.) Robins. in Proc. Am. Acad. xxix. 311 (1894). *Tissa platensis* (St. Hil. & Adr. Juss.) Hassler in Bull. Herb. Boiss. sér. 2, vii. 931 (1907). *T. platensis* subsp. *septentrionalis* Hassler[1] l. c. *T. platensis* var. *septentrionalis* (Hassl.) Hassler, Contrib. Fl. Chaco

[1] This variety must be the same as the species because the characters given, such as stipules widely ovate, petals deficient, style slightly joined at the base, are not sufficient to separate this from the species nor do they characterize var. *Balansae*.

Argentino-Paraguayo, pt. i. (Fl. Pilcomay.) 58 (1909). *S. texana* Hy, Rev. Gen. Bot. xxv. 316 (1913) in obs.[1] *Alsine platensis* (St. Hil. & Adr. Juss.) House in Am. Midl. Nat. vii. 134 (1921). *S. platensis* var. *septentrionalis* (Hassl.) Hauman & Irigoyen in Anal. Mus. Nac. Hist. Nat. Buenos Aires, xxxii. 193 (1923).—South America: common in the Argentine, and probably introduced in central Chile, southern California and Texas. Brazil: no locality, "*St. Hilaire* misit," 1830 (B., marked *Balardia platensis*, probably in Cambessedes' handwriting). Argentina: Prov. Corrientes: salt marshes, Cado de Aposo, *Niederlein* 1171, October 8, 1886 (B.). Prov. Entre Rios: on muddy ground on the banks of the river Gualeguagehn, Concepcion del Uruguay, *Lorentz* 1203, October, 1877 (B.); Medanos, *Burkart* 3572, December 3, 1930 (B.); Concepcion del Uruguay, *Lorentz* 1707, September, 1877 (B.); Delta Paraná, Arroyo Brazo Largo, *Burkart* 8295, December 12, 1937 (F. M.); Islas Victoria, *Burkart* 8623, December 26, 1937 (F. M.); Fontana (Chaco), *Meyer* 2375, November, 1937 (G., D. S.). Prov. Santa Fe: Malabrigo, F. C. S. F., *Burkart* 5749, November 12, 1933 (B.). Prov. Tucumán: on the banks of a dry lake, alt. 300 m., Chanar Pozo, Dept. Leales, *Venturi* 413, September 9, 1919 (U. S.); alt. 450 m. Rio Sali, Dept. Capital, *Venturi* 1908, September 13, 1922 (G., U. S., La Plata); rich meadows, 3000 m. alt., Sierra de Cajou, Dept. Tafi, *Venturi* 10055, January 3, 1929 (U. S.). Prov. Buenos Aires: virgin pastures, Avellaneda, *Parodi* 5847, October 18, 1924 (B.); low brackish places about the R. Paraná, Campana, F. C. C. A., *Burkart* 5655, November 5, 1933 (B.); low flood-plain of R. Paraná, Isla Mariel, *Burkart* 3052, December 6, 1928 (B.); Buenos Aires, *Bettfreund* 188b + 130, misit 1888 (B.); Buenos Aires, *Tweedie* (K.); wet land, Abasto, near La Plata, *Cabrera* 2388, October 19, 1932 (La Plata); Bahia Blanca, *Darwin* (K.). Prov. Rio Negro: Rio Negro, *Aug. Scala* 47 (n. 104 Herb. Scala Rio Negro), January, 1916 (La Plata); in irrigated ground, General Roca and vicinity, Rio Negro Valley (250–360 m. alt.), *Walter Fischer* 166, Nov. 14, 1914 (G., U. S., N. Y., F. M.). Locality not found: Las Palmas, *Niederlein* 128, Aug. 30, 1892 (B.). Locality not given: *Hicken* 486 (Chloris Platensis Argentina) (N. Y., Cal. Acad.). Chile: Prov. Santiago: in plateis urbis, Santiago, *R. A. Philippi*, pl. Chilens. ed. *R. F. Hohenacker* 625 (K.); in the city of Santiago, *Philippi* 1250 (B., marked *Balardia platensis*); *Philippi* ded. 1888 (B.); malza frecuente, Santiago, *Looser* 89, November 10, 1924 (G.). Prov. Bio-Bio: Dept. Angol: Angol, *Philippi* 2284, November, 1887 (Santiago, photo. and fragment in G., type of *S. angolensis* Philippi). No definite locality given: Chile (Leiden), no collector given. North America: Texas: wet sands near Dallas, *Reverchon*, April (Curtiss-N. Am. pl. no. 333* and Texas Flora 72) (G., U. S., B., one of the Berlin sheets and the Gray collection marked *Lepigonum*

[1] Belongs to this species because of the citation, Texas, *Reverchon*, and white flowers and naked cymes, which in combination do not apply to any other species of the region.

gracile[1] by Watson); sandy lands, common, Dallas, *Reverchon* (G.); common in wet places, Columbia, Brazos R., *Bush* 79, April 20, 1900 (G., U. S.). CALIFORNIA: Riverside Co.: desiccating mudflat, one half mile south of Lake Elsinore, *Munz* 5070, April 29, 1922 (Pom., U. C.). Los Angeles Co.: dried ponds near Compton, *Nevin & Parry*, 1881 (G., marked *Lepigonum gracile* by Watson)[2]; Los Angeles, *Parry* 15, 1881 (G., U. S.,[3] marked *L. gracile* by Watson); low brackish flats near coast, Bixby, *Braunton* 436, June 20, 1902 (U. S.), marked *Lepigonum gracile* by Watson); on adobe mesa between Rivera and Florence, *Abrams* 3252, April 14, 1903 (G., U. S., D. S., U. C., Pom.); Inglewood, *Abrams* 1494, April 12, 1901 (D. S., Pom.). San Diego Co.: Carriso Creek, *Brandegee*, April 20, 1893 (U. C.); Otay, *Orcutt* 1201, May 13, 1882 (G.).[3]

S. platensis is quickly separated from all other Spergularias by its delicate habit, very small and numerous capsules, and much compounded cyme. However, there are no characters sufficiently important to warrant placing it in a separate genus such as *Balardia* St. Hilaire & Adr. Juss.[4]

The geographical distribution of this species is very peculiar. It is evident that Argentina is its native home and that it was introduced into Chile, since it has only rarely been collected there and from civilized places. It also seems probable that the Californian and Texan stations represent introductions, though, to prove the point, more collections should be made, especially with historical information regarding the localities at hand.

34. Var. **Balansae**, var. nov. (TAB. 595, FIG. 3e et 3f). Perennis: caudice nodosa, 1–2 caulibus gracilibus erectis, 12–18 cm. longis; internodiis caulis partis efloriferi gracilibus, glabris, 7–24 mm. longis, 0.4–0.6 mm. crassis: foliis vulgo haud fasciculatis vel interdum 1–2 foliis axillaribus, filiformibus, glabris, mucronatis, 15–30 mm. longis, 0.4–0.8 mm. latis; stipulis minimis, triangularibus, tam longis quam latis, 1.2–1.6 mm. longis: floribus in cymam patentem simplicem glabram dispositis; internodiis filiformibus, infimis 4–12 mm. longis; bracteis 0.6–2.2 mm. longis: sepalis lanceolatis, apicibus obtusis, glabris, 2.2–2.8 mm. longis; petalis albis, anguste ovatis, 1.2–1.4 mm. longis; staminibus 5, sepalis adversis; stylis 3, 0.4 mm. longis, ad basim divisis: capsulis maturis 3.2–3.8 mm. longis, sepalis 1–1.2 mm. longioribus; pedicellis fructiferis filiformibus, haud reflexis, infimis

[1] Cited as Curtiss no. 333*, under *Lepigonum gracile* by Sereno Watson in Proc. Am. Acad. xvii. 367 (1882), and also under *Tissa gracilis* by Britt.. in Bull. Torr Bot. Club, xvi. 128 (1888).

[2] Cited under *Lepigonum gracile* by Sereno Watson, but as collected only by *J. C. Nevin*.

[3] Cited under *Tissa gracilis* (Wats.) Britton in Bull. Torr. Bot. Club, xvi. 128 (1888).

[4] In St. Hilaire, Fl. Bras. Mer. ii. 180, t. 111 (1829).

7–10 mm. longis: seminibus eis var. typicae similibus.—South America: known only from Paraguay. Paraguay: in the prairies in impermeable clay soil, *Balansa* 2271, May 27, 1874 (K., type); Villa Fonda, *Kuntze* (N. Y., marked *Buda campestris* by Otto Kuntze).

The variety differs from the typical form of the species in erect habit, perennial root, smaller stipules, simple cyme, and larger sepals and capsules. It is similar in its lack of pubescence, shape of stipule, number of stamens, length of style, leaves, petals, and, most important of all, in having exactly the same seeds. The latter fact is the main reason for giving it varietal rather than specific rank.

35. S. ramosa Camb. (Plate 595, figs. 1a–1d and map 29). Perennial with a heavy ligneous central root: *caudex* well developed, knotty and branched, bearing from 1–15 nearly always erect stems, 8–37 cm. long, often budded from those of the previous season; *internodes of the stem below the inflorescence* usually glabrous though sometimes glandular-pubescent, 4–35 mm., usually 8–20 mm. long, 0.4–2.5, usually 0.8–2 mm. in diameter: *leaves fascicled*, filiform, mucronate, 10–45 mm. long, 0.5–1 mm. wide, usually glabrous, occasionally densely glandular-pubescent; *stipules lanceolate-acuminate, very broad at the base, at least twice as long as broad*, 2.5–7 mm., usually 3–5 mm. long: *inflorescence always glandular-pubescent throughout* with *internodes* roughly equalling or somewhat shorter than those below, 5–30, usually 10–20 mm. long, 0.4–1 mm. in diameter with minute *bracts* 1–4, usually 1.2 mm. long: *sepals* broadly linear-lanceolate, with a narrow scarious margin, always glandular-pubescent, 4.5–10 mm., usually 6–8 mm. long; *petals* white, ovate, 3–8 mm., usually 4–6 mm. long, 0.5–4 mm., usually 1–3 mm. shorter than the calyx; *stamens* 6–9; *styles* 3, parted to the base, 1–1.4 mm. long: *mature capsules* with valves often purple-tinged inside at the apex, 6–11.5 mm., usually 7–9 mm. long, occasionally equal to the calyx but usually 0.5–4 mm., commonly 0.5–2 mm. longer than the calyx: *fruiting pedicels* never reflexed, the lower 5–21 mm. long: *seeds* 0.6–0.9 mm., usually 0.7–0.8 mm. long, *light brown, dull, rounded in outline, surface usually smooth but sometimes covered with regularly arranged, brownish papillae, surrounded by a broad, shining, entire wing, often tinged with brown*, 0.3–0.7 mm., usually 0.4–0.6 mm. wide.—Camb. in St. Hil. Fl. Bras. ii. 178 (1829); Gray, Bot. Wilkes Exped. 1838–42, i. 121 (1824); Kindb. Synop. 16 (1856) (though Kindberg questioned whether it was a *Spergularia* and placed it under species excluded); Arech. in Ann. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 95 (1901). *Arenaria grandis* sensu HBK., Nov. Gen. et Sp. vi. 24 (1823), ex char., "Vidi in A. grandi: stamina 10 et stylos tres; . . .", non *Spergula grandis* Pers. (1805). *Arenaria grandis* sensu DC. Prod. i. 401 (1824), in small part, including only the reference HBK., non *Spergula grandis* Pers. (1805); Gay, Fl. Chile, i. 267 (1845), for the most part, excluding

only reference to DC. in part, non *Spergula grandis* Pers. (1805). *Spergularia macrocarpa* Presl, Rel. Haenk. ii. 9 (1831), excluding synonyms Pers. and DC. *S. racemosa* G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), probably an error in spelling for reference is made to Camb. *S. grandis* sensu G. Don, l. c., in part, including synonym *Arenaria grandis* HBK. and excluding *S. grandis* Pers., non *Spergula grandis* Pers. (1805); sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the 3-merous element of the description and the synonyms *Arenaria grandis* HBK. and DC. "forma trigyna," *Spergularia macrocarpa* Presl, *Lepigonum grande* (Pers.) Kindb. and *Lepigonum arenarium* Kindb. in part (see the synonymy of *S. villosa*), and excluding the 5-merous element of description and all other synonyms, all of which elements belong with *S. ramosa, q. v.*), non *Spergula grandis* Pers. (1805); sensu Rohrb. in Linnaea, xxxvii. 236 (1871–73), in part, for the same reasons as above, non *Spergula grandis* Pers. (1805); sensu Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru pt. 2, no. 2, 631 (1937) (because collection cited is from Huanuco: Montana, *Haenke*), non *Spergula grandis* Pers. (1805). *Spergula racemosa* D. Dietr. Syn. Pl. ii. 1599 (1840), probably likewise an error, for reference is made to Camb. *Lepigonum grande* sensu Kindb. Syn. Lepig. 15 (1856), including ref. Presl and, in part, DC., non *Spergula grandis* Pers. (1805). *L. arenarium* Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863), in part (including references HBK. and *S. ramosa* Camb., and the citations Montevideo, *Sello*, and Rio Negro, *Wilkes Exp.* and the right-hand plant in the figure including the entire-winged seed; excluding the remaining references, citations (*Lambert* ?), and illustration, all of which belong with *S. villosa*). *Lepigonum trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including Brazilian specimens and in part Montevideo, *Sello*, spec.; excluding references Camb. and Pers. and specimen, Chile, *Bertero*, which is *S. villosa*, and part of Montevideo, *Sello*, which is *S. rupestris*, and Maldonado?). *S. villosa* var. α *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61, fig. 1 (1872), in part (including only the specimen, Sorata, *Mandon* 946, and the figure; excluding the right-hand, narrow-winged seed which is from *S. rupestris*); Rohrb. in Linnaea xxxvii. 238 (1871–73), in part (including *Mandon* 946 and possibly part of the *Sello* collections; excluding all references which apply to *S. villosa* and *S. rupestris*). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the synonyms *S. ramosa* Camb. and *Spergula racemosa* Dietr.; excluding the remainder, which belong with *S. villosa*); Rohrb. in Linnaea, xxxvii. 243 (1871–73), in part, for same reasons as above. *Buda marina* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), because of citation Patagonia, *Moreno and Tonini* 343, non *Arenaria rubra* var. *marina* L. (1753). *Buda grandis* sensu Kuntze, l. c. (1898), in part (including citations, Rio Santa Lucia, Uruguay and Cochabamba, Bolivia;[1] excluding *Hauthal* 661, and

[1] Another collection cited here, Ceres, Cordoba, though not examined by the

Sierra de Solis, which are *S. levis*), non *Spergula grandis* Pers. (1805); sensu Macloskie in Rep. Princeton Univ. Exp. Patagonia, viii. pt. 1, 395 (1905), non *Spergula grandis* Pers. (1805). *S. villosa* sensu Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, ii. 633, probably (because he says the seeds are yellow, pedicels erect and spreading, and cites Mart. Fl. Bras. xiv. pt. 2, pl. 61, none of which data apply to *S. villosa* (Pers.) Camb.),[1] non *Spergula villosa* Pers. (1805).—South America: common in most of Argentina and southern Uruguay and adjacent southeastern Brazil, also local in Bolivia. Brazil: Brasilia meridionalis, *Sello* 3107[2] (B., seeds papillose on rim, marked *Lepigonum villosum* Kindb. 1861);[3] *Sello* 3107a[2] (B., seeds papillose on rim); Brazil, *Sello* 1840[4] (K., 2 of the plants only, seeds smooth); Porto Alegre, Rio Grande do Sul, *Tweedie* (K., part of coll. only, seeds papillose). Brazil: no locality, *Sello* (Leiden). Uruguay: Dept. Canelones: river shores, Santa Lucia, *H. M. Smith* 53, November 14, 1922 (U. S., seeds smooth); gravelly, dry, exposed soil, Independencia, *Herter* 652, November, 1926 (U. S., seeds papillose). Dept. Montevideo: Montevideo or R. v. Campos-Vitoria, *Sello* d. 2 (B., 5 sheets, K.; only part of most of the sheets, seeds papillose); Montevideo, *Sello* d. 394 (B., 2 sheets; only part of one sheet, seeds hubbled; marked *Lepigonum villosum* (Camb.) by Kindberg, 1861); Montevideo, *Sello* (B., seeds papillose; marked *Lepigonum villosum* by Kindberg, 1861); Montevideo, *Sello* (B., only part of the specimens, seeds papillose; marked *Lepigonum villosum* Kindb., 1861); Montevideo, *Sello* (B., seeds papillose, marked *Lepigonum marinum* by Kindberg, 1861); Montevideo, *Capt. King* (K., immature but has 3 styles, mounted on a sheet with *Arenaria bonariensis* in Hooker Herb.); Montevideo, *Gibert* 410, 1866 (K., seeds smooth); Montevideo, *Sello* d. 2178 (B., seeds smooth, marked *Lepigonum arenarium* by Kindberg, 1861);[5] in pasture lands, near Montevideo, *Safford*, October 24, 1886 (U. S., seeds papillose); exposed dry ground, Arroyo Piedras, *Herter* 652[b], February 5, 1928 (N. Y., seeds papillose only on rim); Pocitos, *H. M. Smith* 15, October 14, 1922 (U. S., seeds smooth); exposed soil, Pocitos, *Herter* 159, November, 1924 (G., B., U. C., seeds smooth); Cerro de Montevideo, *Gibert* 158, March, 1867 (K., seeds hubbled); dry, exposed, gravelly and sandy soil, Cerro, *Herter, Schulz, and Strahl* 650[b], October, 1925 (G., N. Y., F. M., U. C., immature). Dept. San José: sandy ground, Santa Lucia, *Osten* 21691, November 25, 1929 (G., seeds papillose). Dept. Colonia: around

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author, may be the same as others made by *Kuntze* in Cordoba, which are *S. ramosa* var. *diffusa*.

[1] It is interesting to note that neither *S. villosa* nor *S. ramosa* grow in Peru.

[2] Locality found in Urban in Engler, Bot. Jahrb. xvii. 196 (1893); "2994–3330 ebenda von Encrusilhada nach Caçapana und Rio S. Barbara (Nov. Dec. 1825)."

[3] Cited by Kindberg under *L. trachyspermum*, Mon. Lepig. 31 (1863).

[4] Locality found in Urban l. c.: "d.1504–1853—ebenda vom Rio Pardo über Caçapana nach Bagé (Dec. 1823, Jan. 1824)."

[5] Cited under *Lepigonum arenarium* by Kindb. Mon. Lepig. 17 (1863).

Carmelo, *Cabrera* 3189, December 5, 1934 (La Plata, seeds smooth); high lands, Riachuelo, *Cabrera* 3298, April, 1935 (La Plata, seeds papillose); downs, Riachuelo, *Cabrera* 3903, November 15, 1936 (F. M., rim of seed papillose). Uruguay, locality not found: Rio Santa Lucia, *Kuntze*, November, 1892 (N. Y., seeds papillose, marked *Buda grandis* by Kuntze);[1] Uruguay, *St. Hilaire* (Paris, photo. in G.), probably not the type.[2] ARGENTINA: PROV. JUJUY: Dept. Tumbaya: alt. 2400 m., slopes of mts., Volcan-Cerro, Alta Cordoba, *Venturi* 4900, February 17, 1927 (G., U. S., F. M., Cal. Acad., La Plata, seeds smooth). PROV. CATAMARCA: Sancho, Dept. Andalgalá, *Jörgensen* 1607, November 15, 1915 (G., U. C., smooth seeds); Quebrada de Yacutula, *Schickendantz* 304, March, 1878 (?) (B., smooth seeds); at the summit of Cuesta Muschaca, *Schickendantz* 264, February, 1876 (B., seeds smooth); Candada, Dept. Andalgalá, *Jörgensen* 1607, February, 1897 (U. S., seeds smooth). PROV. TUCUMÁN: 2600 m. alt., Estancia Las Pavas, Dept. Chicligasta, *Venturi* 9470, March 14, 1924 (U. S., smooth seeds), and 6886, January 16, 1925 (U. S., smooth seeds); Valle de Tafi, *C. Bruch*, 1908 (La Plata; smooth seeds); Sierra de Tucuman, La Ciénaga, *Hieronymus & Lorentz*, January 10–17, 1874 (B., seeds smooth). PROV. CORRIENTES: Wald vom Riachuelo an Corrientes, *Niederlein*, January 19, 1883 (B., papillose seeds). PROV. SANTA FE: Ceres in Dist. San Cristobal, *Grippel*, October, 1892 (N. Y., papillose seeds; marked *Buda grandis* by Otto Kuntze); around Estancia Leives, Sierra Ventana, *Alboff*, November, 1895 (La Plata, seeds smooth). PROV. CORDOBA: Cordoba, *Lorentz*, November, 1877 (K., smooth seeds); Estancia Germania near Cordoba, *Lorentz* 79, June–December, 1874 (B., seeds smooth); Cordoba, *Galander*, November 19, 1880 (B. One sheet has smooth seeds, the other papillose); Cordoba, *Galander*, November 23, 1880 (B., seeds smooth); Cordoba, *Lorentz* 485 (B., only part of the coll., seeds smooth); Cordoba, *Hieronymus*, October, 1877 (B., smooth seeds); Cordoba, *Lorentz* 324[b], December, 1870 (B., seeds smooth); Lagunas de Peitiado around Cordoba, *Galander*, February 25, 1881 (B., smooth seeds); Potrero de Laya, Sierra Chica, *Galander*, November 31, 1879 (B., seeds smooth); Estancia La Reduccion, Sierra Chica, *Burkart* 7182, December 26, 1935 (G., seeds smooth); Rio Zeballas, Sierra Chica, *Galander*, January 17, 1878 (B., seeds smooth); *Hieronymus*, Sommer, 1874–75 (B., seeds smooth); Cuesta de Copina, las Envenadas Sierra Achala, *Hieronymus*, January 8, 1876 (B., seeds smooth); Cuesta de Ayel, Sierra Achala, *Hieronymus*, January 12–14, 1876 (B., seeds smooth); San Miguel, Sierra Grande, *Hieronymus*, March 27, 1875 (B., seeds smooth); 1400 m. alt., Copina, Sierra Grande, *Burkart* 7181, December 29, 1935 (G., seeds smooth);

[1] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13, Sept. 28 (1898).

[2] Montevideo, the locality given in Fl. Bras. is not on label; the + Cambess. Uruguay on the label is in the handwriting of Spach, and the *S. ramosa* is in secretarial handwriting. Data by courtesy of Mr. C. A. Weatherby.

sands on the banks of the Rio Primavera, Cordoba, *Lorentz* 324[b], 1870 (B., seeds smooth); San Francisco, *Lorentz* 324, February, 1871 (B., 2 sheets, seeds smooth); Prov. Cordoba, no locality, *Lossen* 36, January 25 (G., F. M., B.; only Field Museum coll. mature, seeds smooth); between S. Vicente and the estate of Rueda, Sierra Chica *Kurtz* 6585, December 14, 1889 (La Plata, seeds smooth). Prov. La Rioja: between Cueva de la Mesada and Sucrucijada, Sierra Famatina, *Hieronymus & Niederlein* 528, January 31, 1879 (B., seeds smooth); Vallecito, Sierra Famatina, *Hieronymus & Niederlein* 611, January 21, 1879 (B., seeds smooth); Las Tranquitas, Sierra Famatina, *Hieronymus & Niederlein*, February 10, 1879 (B., immature). Prov. San Juan: Cuesta Nueva, *Hosseus* 2540a, February 28, 1927 (B., immature). Prov. San Luis: Cerro Retana, Sierra de San Luis, *Vignati* 294, January, 1934 (La Plata, seeds smooth); Estancia Grande, *Vignati* 68, January, 1934 (La Plata, seeds smooth); Rio de las Barranquitas, *Vignati* 235, January, 1934 (La Plata, immature). Prov. Buenos Aires: low, brackish ground about the Rio Paraná, Campana F. C. C. A., *Burkart* 5663, November 5, 1933 (B., seeds smooth); in barren pastures, Campana, *Parodi* 8604, October 27, 1928 (G., B., seeds hubbled or smooth); in barren ground, Campana, *Parodi* 11326, November 21, 1933 (G., seeds smooth); in sandy ground, Isla Mariel, Buenos Aires, *Parodi* 8717, December 10, 1928 (G., papillose seeds); in the hills of Curumalán Pigüe F. C. S., *Burkart* 4836, November 14, 1932 (B., seeds smooth); Cerros on the Pigüe, *Scala*, November 7, 1928 (La Plata, seeds smooth); Cerros and Laguna de Puan, *Scala*, November 10, 1928 (La Plata, seeds smooth); Pergamino, *Parodi* 6635, November 12, 1925 (B., seeds smooth); saline places in the fields, Partido Azul, Estancia Salaberry, *Osten* 205, mid-November, 1886 (B., smooth seeds); Wilde F. C. S., *Burkart* 3929, October 20, 1931 (B., immature); Carhuë, Sierras Pampeanas, *Lorentz* 320[c], April, 1881 (B., seeds smooth); Arroyo Cortapié, Sierras Pampeanas, *Lorentz* 320[b], March 19, 1881 (B., seeds smooth); Sierra Ventana, Sierras Pampeanas, *Lorentz* 320[a], February–April, 1881 (B., seeds smooth); Sierras Pampeanas, *Lorentz* 360, February–April, 1881 (B., seeds smooth); Sierra Ventana, *Alboff* (La Plata, seeds smooth); Bahia Blanca, *Darwin*, early in October, 1832 (K.); Carmen de Patagones, *C. Berg* 33, November 17, 1874 (B., seeds smooth). Prov. Rio Negro: vicinity of General Roca (alt. 250–360 m.), *Walter Fischer* 65, December 29, 1914 (G., U. S., N. Y., F. M., seeds smooth); northern bank of Rio Negro, near the island Choele-Choel, *Lorentz*, May 29, 1879 (B., seeds smooth); common between Laguna de Las Bandurrias and Fortin Fé, *Lorentz*, April 24, 1879 (B., seeds smooth); Rio Negro, *Scala* 46 and 48, January, 1916 (La Plata, seeds smooth); Rio Negro, *Wilkes Exped.* 1838–42 (G., U. S., N. Y., seeds smooth). Prov. Chubut: seacoast, Port Madrin, *Bettfreund* 52 (B., seeds smooth). Patagonia: Quilbay, *Bettfreund* 1249, March, 1893 (B., seeds smooth); Patagonia, *Moreno & Tonini* 343, 1882 (N. Y.,

marked *Buda media* Dum. (L.) by Kuntze; over-ripe, no seeds).[1] Prov. Santa Cruz: Port Desire, *Darwin* (K., seeds smooth); 200 m., Minerales, *Donat* 197, November 14, 1929 (G., Cal. Acad., F. M., U. C., seeds smooth); Cañadon de las Vacas (Sec. xv), *Beoufals* (?) (La Plata, seeds smooth). Bolivia: Dept. Cochabamba: 2700 m. alt. Cerritas, *Steinbach* 4007, April 16, 1920 (B., elongate inflorescence showing tendency toward *S. pazensis*, seeds smooth); 2600 m., Cochabamba, *Bro. Julio II* 262, 1932 (U. S., open inflorescence, habit showing tendency toward *S. pazensis*, seeds smooth); 3000 m., Cochabamba, *Kuntze*, March 26, 1892 (N. Y., seeds smooth, protracted inflorescence showing tendency toward *S. pazensis;* marked *Buda grandis* by Otto Kuntze);[2] common on the slopes of the hills, Cochabamba, *Parodi* 10193, February 15, 1932 (G., hubbled seeds, protracted open inflorescence similar to that of *S. pazensis*). Dept. Larecaja: 2600–2790 m. alt. near Sorata, *Mandon* 946, 1898 (?) (N. Y., F. M., typical of *S. ramosa*, seeds smooth);[3] 7000 ft., Sorata, *R. S. Williams* 1541, October 2, 1902 (N. Y., seeds papillose on the rim, habit typical of *S. ramosa*). Without locality: *Haenke*[4] (B., marked *Spergularia macrocarpa* Presl[5] and also *Lepigonum marinum* by Kindberg, 1861; seeds smooth and typical of *S. ramosa*).

At first it seems odd that one species should have both smooth and papillose seeds. Further study reveals a few specimens with papillae confined to the swollen rim of the seed, leaving the flat sides smooth, and a few more specimens only slightly hubbled in the same pattern as the papillae of the papillose seeds. The smooth seeds are generally a little larger, 0.7–0.9 mm. long, the majority 0.8 mm., while the papillose ones are 0.6–0.8 mm., the majority between 0.7 and 0.8 mm. But since the shape, color, and wings of both are the same and since both have similar capsules, sepals, leaves, stipules, and geographic range, the papillose-seeded trend deserves no taxonomic recognition. A few specimens in Bolivia have elongate inflorescences and habit similar to *S. pazensis*, which see for discussion.

The only St. Hilaire specimen in the Paris Museum that could be the type of *S. ramosa* has neither the handwriting of Cambessedes, nor the type locality, Montevideo. The plant has longer internodes in the inflorescence and therefore more lax habit than is usual in the

[1] Cited under *Buda marina* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898)

[2] Cited under *Buda grandis* by Kuntze, l. c. (1898).

[3] Cited under *S. villosa* var. α *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61. fig. 1 (1872).

[4] Locality given in Presl, Reliq. Haenk. ii. 9 (1831), "Habitat in Peruviae montanis huanoccensibus et in Cordilleris de Chile."—which is probably incorrect because this species is not known from Chile and Haenke *did* go to Buenos Aires and Montevideo where it is common.

[5] Cited as type of *Spergularia macrocarpa* by Presl. Rel. Haenk. ii. 9 (1831).

wide-ranging species under discussion. According to the description of Cambessedes in St. Hilaire, Fl. Bras. ii. (1829), the internodes below should be 6–8 lines or ca. 12–16 mm. long, the pedicels 1–4 lines or ca. 2–8 mm. long, and the internodes above should be twice as long as those below. The plant labeled *S. ramosa* in Paris has the internodes below 25–30 mm. long, the peduncles 7.5–12.5 mm. long, and the internodes below equal to those above. It must be assumed, then, at present, that this plant is not the type but was probably identified by Cambessedes. However, the detailed description by Cambessedes coincides in all measurements and other characters with the species under discussion. It may now be asked whether the plant in the Paris Museum could belong to another species of the region. It differs from *S. levis* in having light brown, unsculptured seeds with dark brown papillae and an entire wing, glandular-pubescent inflorescence and capsule equal to the calyx. It also differs from *S. grandis* in having light brown, unsculptured seeds and 3-valved capsules nearly equal to the calyx. This plant may possibly be *S. ramosa* var. *diffusa*, because of its elongate inflorescence and small seeds which measure 0.5 mm. in length. However, the seeds are not mature and the capsule does not protrude from the calyx as is characteristic of the variety. Therefore, the sensible thing to do is to relegate the plant to *S. ramosa* for the present with the hope that future collecting will throw more light upon the subject. The name *S. ramosa* is, therefore, retained on the strength of Cambessedes' good description.

36. Var. **diffusa**, var. nov. (TAB. 595, FIG. 1e–1g). Perennis: radice centrali farinacea cortice leve suberea, interdum 1 cm. crassa: caulibus 2–6, erectis, 15–35 cm. longis, interdum ramosis infra; internodiis caulis partis efloriferi glabris vel villoso-glandulosis, vulgo longis gracilibusque, 10–42 mm., vulgo 15–25 mm. longis, 0.6–1.5 mm., vulgo 0.8–1.2 mm. crassis; foliis fasciculatis, filiformibus, mucronatis, 15–50 mm. longis, 0.6–1.2 mm. latis, vulgo villoso-glandulosis interdum glabris, saepe late patentibus pseudoverticillatis; stipulis triangularibus acuminatis, vulgo tam longis quam latis, 1.2–5 mm., vulgo 1.2–3 mm. longis: floribus in cymam patentem dispositis semper villoso-glandulosis; internodiis 10–30 mm., vulgo 13–20 mm. longis, 0.4–1 mm. latis; bracteis minimis, 1–3 mm. longis: sepalis ovatis, abrupte acutis, villoso-glandulosis, 3.2–5 mm. longis: petalis albis ovatis, 2.5–4 mm. longis, vulgo sepalis 0.5–1.2 mm. brevioribus; staminibus 6–9; stylis 3, ad basim divisis, 0.7–0.8 mm. longis: capsulis maturis 5–8 mm. longis, sepalis 1/3 (2–3.8 mm.) longioribus: pedicellis fructiferis haud reflexis, infimis 5–20 mm. vulgo 10–15 mm. longis: seminibus vulgo papillatis interdum levibus, 0.6–0.8 mm., vulgo 0.6–0.7 mm.

longis, caetera eis varietatis typicae similibus.—Usually not separated as a variety and identified under the incorrect epithet *grandis*, as in the following: *Tissa grandis* sensu Morong & Britt. in Ann. N. Y. Acad. Sci. vii (Enum. Pl. Paraguay) 53 (1892), in part, including *Morong* 921 and excluding Buenos Aires 3 which is *S. villosa*, non *Spergula grandis* Pers. (1805); sensu Chod. & Hassl. in Bull. Herb. Boiss. sér. 2. iii. (Pl. Hassl. ii. 171, reprint) (1903), at least in part, *i. e. Hassler* 1188 (the other coll. cited not seen), non *Spergula grandis* Pers. (1805).—SOUTH AMERICA: In Paraguay and in the northern interior of Argentina. PARAGUAY: Gran Chaco, *Andrew Pride*, (K., seeds papillose); near Assomption in the prairies in impermeable clay soil, *Balansa* 2272, September 25, 1875 (K., seeds papillose); Loma Clavel, lat. S. 23° 20′, Gran Chaco, *Rojas* 2475, November, 1903 (G., F. M., seeds papillose); in fields, Tacural, *Hassler* 1188 (N. Y., immature); Pilcomayo River, *Morong* 921 (1888–1890) (G., U. S., N. Y., F. M., seeds papillose). ARGENTINA: PROV. FORMOSA: Formosa, *Jörgensen* 3202, August, 1919 (G., U. S., seeds papillose). PROV. JUJUY: in saline soil, Piquete (?), *R. E. Fries* 486, 1901 (U. S., over-ripe, no seeds); on saline, sandy banks of Laguna de la Bier, *R. E. Fries* 110, 1901 (U. S., seeds papillose). PROV. TUCUMÁN: calcareous ground, Cerro del Campo, Dept. Burruyacu, *Venturi* 7722, December 16, 1928 (G. TYPE, U. S., seeds papillose); border saline lakes, Chanar Pojo, Dept. Leales, *Venturi* 466, September 18, 1919 (U. S., immature). PROV. ENTRE RIOS: Concepcion del Uruguay, *Niederlein*, May 11, 1880 (B., over-ripe, no seeds). PROV. SANTA FÉ: Colonia Humboldt, Dist. Colonias, *E. Hunyiker* 40, October 6, 1875 (B., seeds papillose but immature); Chaco Santafecino, Lanteri (F. C. S. F.), *Burkart* 5750, November 10, 1933 (B., seeds papillose). PROV. CORDOBA: Gusapampa, Dept. Minas, *Hieronymus*, March 17, 1877 (B., seeds smooth); Troncho-payo around Carroya, *Galander* 35, November 27, 1880 (B., seeds not mature); Cordoba, *Kurtz* (N. Y., immature); Cordoba, *Kuntze*, December, 1891 (N. Y., La Plata, seeds papillose); Rio Zeballos, Sierra Chica, *Galander*, February 14, 1878 (B., seeds papillose). PROV. LA RIOJA: Nonogasta, Dept. Chilecito, *Venturi* 7791 December 28, 1928 (G., U. S., seeds smooth). MAP 30.

Var. *diffusa* differs from the typical variety of the species in having longer internodes, more fleshy tap-root, usually smaller stipules, shorter sepals, shorter styles, more protruding capsule, and usually smaller seeds. It is the same as the typical variety in number of stamens, length of pedicels, and type of seeds and wing.

37. S. LEVIS Camb. (PLATE 596, FIGS. 2a–2c, MAP 31). *Perennial*, *entirely glabrous*, with a tap-root: *caudex* bearing from 2–6 stems, erect or nearly so, 20–40 cm. long; *internodes of stem below the inflorescence* glabrous, 28–50 mm. long, 1.2–3 mm., usually 1.2–2 mm., thick: *leaves not fascicled*, or sometimes 1–2 leaves at the axil, linear-filiform,

usually blunt at the apex, 22–80 mm., usually 30–45 mm. long, the very long ones occurring only toward the base, 0.8–1.6 mm., usually 1–1.4 mm. wide, always glabrous; *stipules* very broadly lanceolate-acuminate, 3.5–7 mm., usually 4.5–6 mm. long: *inflorescence* a strict cyme, *always glabrous throughout,* with the internodes shorter than those below, the lower 5–30 mm., usually 10–25 mm. long, 0.4–0.7 mm. wide; *bracts* filiform, wanting or as much as 8 mm. long: *sepals* ovate, abruptly acute, broadly scarious-margined, glabrous, 2.8–6.8 mm. long; *petals* ovate, white, 2 mm. long; *stamens* 7–10; *styles* 3, separated to base, 0.3–0.6 mm. long: *mature capsules greatly exceeding the calyx,* 5–8.4 mm., usually 6–8 mm. long, 1.6–3.4 mm., usually 2–3 mm. longer than the calyx: *fruiting pedicels* filiform, glabrous, never reflexed, the lower 7–20 mm. long: *seeds* 0.6 mm. long, *deep reddish-brown, often glistening, pyriform, surface covered with closely interwoven, deep, vermiform sculpture, with reddish, glandular papillae scattered at regular intervals over the whole surface, always surrounded by a scarious, white, erose wing,* 0.2–0.4, usually between 0.2 and 0.3 mm. wide.—Camb. in St. Hilaire, Fl. Bras. ii. 176 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831); Kindb. Synop. 16 (1856), among the species excluded from *Lepigonum;* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270, fig. 62 (1872), in part (including the following parts of the description: 3-merous element, glabrous calyx and erose wing of seed, including also the figure, except for the capsules with five valves and collections, Rocha, *St. Hilaire,* and Rio de Janeiro, *Sello;* excluding at least part of the Montevideo, Brasil, *Sello* coll., which is *S. grandis, q. v.*); Arech. in Anal. Mus. Nac. Montevideo, vi. iii. (Fl. Uruguay i.) 94 (1901). *Arenaria bonariensis* Gill. in Hook. & Arn. Misc. Bot. iii. 148 (1832); Steud. Nom. Bot. ed. 2, i. 123 (1840), in part, excluding reference, *Spergularia rupestris* Camb. *Spergula laevis* (Camb.) D. Dietr. Syn. Pl. ii. 1599 (1840); Steud. Nom. ed. 2. ii. 617 (1841). *Lepigonum laeve* (Camb.) Kindb. Mon. Lepig. 32, t. ii, fig. 18 (1863). *Buda grandis* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), in part (including citations, Sierra de Solis, Uruguay, and Buenos Aires, *Hauthal* 661; excluding the remainder of citations which belong with *S. ramosa, q. v.*), non *Spergula grandis* Pers. (1805). *Spergularia bonariensis* (Gill.) Hicken, Chloris Plat. Argent. 104 (1910), as to source of name, but only in part as to plants, including only the reference *S. laevis* Camb. (specimens cited have not been seen by the author).—South America: Southern Brazil and common in Uruguay and in the Argentine about Buenos Aires. Brazil: Ad ripas S. João, *Sello,* November 23[1] (B., marked *Lepigonum laeve* (Cambess.) by Kindberg 1861); no locality, *St. Hilaire* 2039 (Paris, probably type, photo. in Gray,[2] immature, and B., marked *Lepigonum laeve* by Kind-

[1] According to Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270 (1872), the locality for this is "ad ripas fluminis S. João, Rio de Janeiro." Cited by Kindberg under *Lepigonum laeve,* Mon. Lepig. 32 (1863).

[2] One label has *Spergularia levis* + probably in Cambessedes' handwriting. The other was written by Spach. This specimen may not be the type because it does not

berg, 1861, immature).[1] URUGUAY: Sierra de Solis,[2] *Kuntze*, November, 1892 (B., N. Y., both marked *Buda grandis* (Pers.) Camb. by Kuntze;[3] littoral, Playa Ramirez, *Hugh M. Smith* 139, October 29, 1922 (U. S., has one 4-valved capsule); Barra del Sta. Lucia, Dept. San José, *Herter* 159[d], November, 1927 (N. Y.); Montevideo, *Sello*, October 22 (B.); in the fields, Montevideo, *Gibert* 751, October, 1867 (K.), October, 1858, Montevideo (K.); alt. 0–10 m., Pocitos-Malvin, Dept. Montevideo, *Herter* 76260, November 23, 1924 (B.); Montevideo, *Gibert* 168 (K.). ARGENTINA: PROV. ENTRE RIOS: im trocknen, steinigen Camp vor d. Lagune, Concepcion del Uruguay, *Lorentz*, October, 1875 (B.); Concepcion del Uruguay, *Lorentz* sub 282, October, 1875 (B.); Concepcion del Uruguay, *Niederlein* 15, May 7, 1880 (B.). PROV. BUENOS AIRES: Delta del Paraná, Corabelas, *Burkart* 4462, February 16, 1932 (B.); sandy brackish flats near the Paraná,[4] Campana F. C. C. A., *Burkart* 5667, November 5, 1933 (B.); Saavedra, *Bettfreund* 1022, 1896 (B., only part of the plants on the sheet); in abundance in la Baca Palermo, Barracas, etc. around Buenos Aires, *C. Berg* 220, October, 1875 (B.); Buenos Aires, *Hauthal* 661, 1891 (N. Y., from Herb. Otto Kuntze and marked *Buda grandis* presumably by him);[5] plains of Buenos Aires, *Gillies* (K., photo. in G., type of *Arenaria bonariensis* Hook. & Arnott); Buenos Aires 5, *Gillies* (K.);[6] Buenos Aires 188 and 188a, *Bettfreund* (B.); Punta Lara, *Alboff* 1895 (La Plata); rich meadows between La Plata and Ensenada, *Cabrera* 1774, October 9, 1931 (U. S., F. M., immature); La Plata, *E. L. Ekman* 1875, October 20, 1907 (N. Y.). TERR. SANTA CRUZ: 200 m. alt., Minerales, *Donat*, 198, October 16, 1929 (G., N. Y., F. M., Cal. Acad., U. C.,[7] nearly mature (N. Y. is mature) but with unusually short stems).

This species is distinguished from others of similar habit of the same region by its entirely glabrous quality (hence the name *levis*) and the strongly erose margin of the seed. It is further distinguished from *S. ramosa* by its darker, sculptured seeds, strongly protruding capsules, shorter styles, and longer internodes throughout the whole plant. It is further separated from *S. grandis* by its three-valved capsules and three shorter styles.

(To be continued)

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have the definite type-locality, Rocha, Uruguay. Photo. and data by courtesy of Mr. C. A. Weatherby.

[1] Cited under *Lepigonum laeve* by Kindb. Mon. Lepig. 32 (1863).

[2] At the junction of Minas, Canelones and Maldonado Prov.

[3] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[4] On such, low, flat, barren ground all the species of *Spergularia* of the region seem to assemble.

[5] Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

[6] Hooker, Bot. Misc. iii. 148 (1832) says, "Ditches near Buenos Aires—*Dr. Gillies.*" Neither the sheet with "n. sp. Gillies" on the label nor the one marked "B. A. 5 *Gillies*" have this actual data recorded upon them, though they are both mounted on Herb. Hook. sheets under *Arenaria bonariensis* Gill.

[7] Possibly introduced from Buenos Aires and Montevideo?

SPERGULARIA IN NORTH AND SOUTH AMERICA

Ruth P. Rossbach

(*Continued from page 193*)

38. S. GRANDIS (Pers.) Camb. (PLATE 596, FIGS. 1a–1c and MAP 32). Perennial with a heavy tap root: *caudex* bearing 2 or more nearly erect stems, 25–40 or more cm. long; *internodes of stem below the inflorescence usually very long* (10–84 mm.), 2–2.5 mm. in diameter, glabrous or sometimes with sparse glandular pubescence above: *leaves fascicled*, mucronate, usually glabrous, 25–60 mm. long, 1–2 mm. wide; *stipules* broadly lance-acuminate, 3–5.5 mm. long: *inflorescence* an open cyme with large flowers, glandular-pubescent throughout; the *internodes* 7–50, usually 20–30 mm. long; *bracts* minute, 1.5–3 mm. long: *sepals* broadly linear, *glandular-pubescent*, 5 mm. long; *petals* ovate, white, 3–4 mm. long; *stamens* 8; *styles* 4–5, 0.8–1 mm. long, separated to the base: *mature capsules 4–5-valved*,[1] 7–8 mm. long, exceeding the calyx by 2–3 mm.: *fruiting pedicels* not reflexed, the lower 7–20 mm. long: *seeds dark brown, nearly black, shining, rounded in outline, rigid-papillose or not, surface sculptured in crowded interwoven vermiform pattern*, 0.6–0.8 mm. long, *surrounded by a brown-tinged wing with entire margin*, 0.4–0.6 mm. wide.—In St. Hilaire, Fl. Bras. ii. 177 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), in part, including synonym *Spergula grandis* Pers. and excluding *Arenaria grandis* HBK.; Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the 5-merous element of the description and the two synonyms *Spergula grandis* Pers., "forma pentagyna," and *Spergularia grandis* (Pers.) Camb.; but excluding the synonyms *Arenaria grandis* HBK., and DC. "forma trigyna," *Spergularia macrocarpa* Presl and *Lepigonum grande* (Pers.) Kindb., all three of which are *S. ramosa;* also excluding *L. arenarium* Kindb. which is a mixture of *S. ramosa* and *S. villosa*); Rohrb. in Linnaea xxxvii. 236 (1871–73) in part, for the same reasons as above; Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 95 (1901); Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru, pt. 2. no. 2, 631 (1937), as to source of name but not as to plants discussed.[2] *Spergula grandis* Pers. Syn. i. 522 (1805); Poiret, Enc. vii. 305 (1806); D. Dietr. Syn. Pl. ii. 1598 (1840). *Arenaria grandis* (Pers.) HBK. Nov. Gen. and Sp. vi. 24 (1823), as to source of name, not as to plants discussed which are *S. ramosa*, "Vidi in A. grandi stamina 10 et stylos tres;" *Arenaria grandis* DC. Prod. i. 401 (1824), in part, including references Pers. and Poir., excluding HBK.; Steud. Nom. Bot. ed. 2, i. 124 (1840), in part, including references Pers., and excluding HBK. and Presl; Gay, Fl. Chile, i. 267 (1845), as to source of name in part (*i. e.* DC.; see above under *Arenaria grandis*), not as

[1] In one case (see citations), a collection having otherwise the characteristics of *S. grandis* has 3 valves to the capsule.

[2] *S. grandis* does not grow in Peru—the Haenke specimen cited is *S. ramosa* l. c. and "Ruiz and Pavon, without locality," has not been seen by the author.

to plant described (*S. macrocarpa* Presl is true *S. ramosa*). *Lepigonum grande* (Pers.) Kindb. Syn. Lepig. 15 (1856), as to source of name, but not as to the reference *S. macrocarpa* Presl which pertains to *S. ramosa*.[1] *Spergularia levis* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270, fig. 62 (1872), in part (because, according to description, the plant may have pubescent calyces, 5-valved capsules (see fig.), or entire winged seeds (all of which characterize *S. grandis*) and because a *Sello* collection from Brazil with no definite locality cited and marked *S. levis* by Rohrbach is *S. grandis*), non Camb. (1829). *Spergularia platycaulis* Bartl. ex Rohrb. in Mart. Fl. Bras. xiv. ii. 271 (1872), manuscript name given as a synonym of *S. grandis* (Pers.) Camb.; Bartl. ex Rohrb. Linn. xxxvii. 237 (1871–73), same as above. *Tissa grandis* (Pers.) Morong & Britt. in Ann. N. Y. Acad. Sci. vii. (Enum. Pl. Coll. Morong in Paraguay), 53 (1892), as to source of name, not as to plants discussed (citations Morong 921 = *S. ramosa* var. *diffusa* and Buenos Aires 3 = *S. villosa*); Meigen in Bot. Jahrb. xvii. 235 (1893), as to source of name but not as to plant discussed[2] which grows in Chile; Chod. & Hassl. in Bull. Herb. Boissier, ser. 2, iii. (Pl. Hassl. ii.) 171 (renumb.) 1903, as to source of name but at least in part not as to plants cited (Hassler 1188 = *S. ramosa* var. *diffusa;* Campo Cerrito n. 924a not seen). *Buda grandis* (Pers.) Kuntze, Rev. Gen. iii. pt. 2, 13 (1898), as to source of name but not as to plants discussed (citations Buenos Aires, Argentina, *Hauthal* 661 and Sierra de Solis, Uruguay = *S. levis;* Cochabamba, Bolivia and Rio Santa Lucia, Uruguay = *S. ramosa;* Ceres, Cordoba, Argentina = *S. ramosa* var. *diffusa*); not Macloskie in Rep. Princeton Univ. Exp. Patagon. viii. i. pt. 5, 395 (1905) which is probably *S. ramosa*.— South America: southeastern Brazil and Uruguay. Brazil: Prov. Santa Catharina: sandy sea coast, San Jose, *Ule* 472, October, 1886 (B., by using the date, locality fixed from Itiner. Ule in Mart. Fl. Bras. i. pt. 1. 125). Prov. Rio Grande do Sul: in pastures, Estancia Santo-Rei near San Francisco de Borja, *St. Hilaire* 2683 bis, March, 1821 (Paris, photo. in G.). Brazil, without stated locality: *St. Hilaire* (B., marked *Spergula grandis* Pers. by Kindb. 1861); *Sello* 3961[3] (B., 2 sheets, one marked *Spergula grandis* Pers. by Kindb., 1861); *Sello* 3727[3] (B., 2 sheets); *Sello* 3777[3] (B.); *Sello* (B., no data, marked *Spergularia levis* Camb. by Rohrbach); *Sello* (K., no data, mounted on a sheet with *Alsine marina* in Herb. Hook.); native of fields and plains, observed in flower in May, *Sello*, no number (K., the capsules with 3 valves, yet the seeds typical); *Sello* (Leiden, no data,

[1] Kindberg in his later Mon. Lepig. 18 (1863) excludes *Spergula grandis* Pers. from *Lepigonum* because it has 5 valves to the capsule.

[2] From Chile—3100–3200 m. (5.2.92.bl.n.425); although specimen has not been seen by the author, it cannot be *S. grandis*.

[3] According to the biographical sketch of *Sello* by Urban in Engler, Botanischer Jahrbucher, xvii. 196 (1893), collection comprising numbers "3624–4097 ebenda von Alegrete über die Misiones durch den nördlichen Teil des Staates nach Porto Alegre (Mai–Nov. 1826)."

plant typical). URUGUAY: Montevideo, *Commerson* (Paris, TYPE presumably, photo. in G., not marked by Persoon, but from Herb. Juss. 13052).

This species is closely related to both *S. ramosa* and *S. levis*, having characters of both. The seed-body is like that of *S. levis* but the wing is like that of *S. ramosa*. The plant has long internodes both below and within the inflorescence, as does *S. levis*, but it has pubescent calyces as in *S. ramosa*. The capsule exceeds the calyx by 2–3 mm. as does that of *S. levis*, while that of *S. ramosa* is about equal to the calyx. *S. grandis*, however, has one distinctive character, one which is anomalous in the genus, 4–5 valves to the capsule. The range of *S. grandis* is roughly within the ranges of both *S. ramosa* and *S. levis*. These facts should provoke cytogenetic experiments.

39. S. **pazensis** (Rusby), comb. nov. (PLATE 596, FIGS. 5a–5c and MAP 33). Perennial: *caudex* well developed, branched and knotted, bearing from 3–∞ diffuse stems, 10–45 cm. tall; *internodes of stem below the inflorescence* always glandular-pubescent, 7–50 mm. long, 0.8–1.5 mm. in diameter: *leaves* fascicled, mucronate, the upper usually glandular-pubescent, the lower often glabrous, 7–35 mm. long, 0.4–1 mm. wide; *stipules* broadly lanceolate, acuminate, 4–7 mm. long: *inflorescence a lax cyme* with densely glandular-pubescent *internodes* 8–40 mm. long, 0.4–0.8 mm. wide and densely pubescent *bracts* 1–7 mm. long: *sepals* linear, acute, densely covered with long, spreading glandular pubescence, often purple-tipped, 5.8–10 mm., usually 6–8 mm. long; *petals* white, ovate, 4–6 mm. long, as much as 1–2.4 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separate to the base, 1–1.8 mm. long: *mature capsules* 6.2–8.4 mm. long, equal to or as much as 0.2–2 mm. longer than the calyx:[1] *fruiting pedicels* filiform, glandular-pubescent, never reflexed, 3–30 mm., usually 10–30 mm. long: *seeds pyriform, dark brown or black, glistening, surface deeply sculptured in vermiform pattern but often so molded as to obscure the definite pattern of the depressed sculpture, usually covered with large, dark papillae*,[2] which are occasionally confined to the swollen rim, 0.8–1 mm. long, *usually surrounded by a nearly entire, broad, white wing*, 0.3–0.4 mm. wide, *with a blackish zone next to the seed*, occasionally surrounded by a very narrow, black, heavy rim.—*Tissa villosa* (Pers.) Britt. in Bull. Torr. Bot. Club xvi. 62 (1889), as to plant but not name. *Tissa pazensis* Rusby in Bull. New York Bot. Gard. vi. 503 (1910). *Spergularia villosa* (Pers.) Buchtien, Contrib. Fl. Bolivia pt. 1. iii. (1910), as to plant but not name.—SOUTH AMERICA: Found only in Bolivia. BOLIVIA: DEPT. LA PAZ: 10,000 ft. near La Paz, *Rusby* 1180, April, 1885 (N. Y., G.);[3] stony cliff, 3500 m. alt., *Bro. Julio* 495.

[1] In one case the capsule is shorter than the calyx, i. e. Unduavi Valley, *Bro. Julio* 495.

[2] Rarely with no papillae, i. e. Totora, *Herzog* 2037a, which is the only example.

[3] Cited under *Tissa villosa* by Britt. in Bull. Torr. Club, xvi. 62 (1889).

La Paz, *Pennell* 14223, May 19–20, 1925 (F. M.); 11500 ft. alt., La Paz, *Williams* 2336, August 20, 1907 (N. Y., TYPE, U. S.); arid slopes, 3750 m., La Paz, *Buchtien* 520, 520a, December 14, 1918 (N. Y., F. M., U. S.); 547, same locality and date (N. Y., F. M.); alt. 3800 m., La Paz, *Buchtien* 520, December 12, 1919 (F. M.); about 3600 m. alt., La Paz, *G. Hammarlund* 482, 20/4–10/5, 1934 (N. Y., F. M.); 12–13000 ft. alt., La Paz, *R. Pearce*, May, 1865 (K.); brushwood formation 3700 m. alt., La Paz, *Troll* 4342, September 5, 1926 (B., immature); La Paz, *Seler* 118, June 20, 1910 (B., immature); La Paz, *Rose* 18904, August 15, 1914 (U. S.); dry mountain slope, 3800 m. alt., La Paz, *Buchtien* 9, May 20, 1906 (U. S.); Unduavi, *Bro. Julio* 387 (U. S.); sunny slopes about 3700 m. alt. at La Paz, *Th. Herzog* 2451, September, 1911 (B., immature); 2360 m. alt., base of Mt. Illimani, Rio Palea Valley, *Bro. Julio 51* (U. S., immature); 2600 m. alt., Unduavi Valley, *Bro. Julio* 495 (U. S.); Talca Chugiaguillo, *Bang* 814, April, 1890 (N. Y., B., U. S., G.); 10,000 ft. alt., Sorata, *G. H. H. Tate* 767, May 1, 1926 (N. Y.); 6,000 ft. alt., Yungas, *Rusby* 1181, 1885 (N. Y., G., U. S., immature but of lax habit, cited as *Tissa villosa* (Pers.) by Britton).[1] DEPT. COCHABAMBA: 3000 m. alt. on Rio Tapacari, *Kuntze*, March 19, 1892 (N. Y., immature but with short internodes, marked *Buda grandis* by Kuntze); on high plateaus about 3000 m. alt., Totora, *Th. Herzog* 2037a, April, 1911 (Leiden, lax inflorescence). DEPT. TARIJA: 3500 m. alt., Escayache bei Tarija, *Fiebrig* 2793, March 29, 1904 (F. M., B., short internodes and inflorescences, habit like the average *S. ramosa*).

Generally distributed as *Tissa villosa* (Pers.) Britt.

There is a remarkable similarity between *S. pazensis* and *S. ramosa*. The measurements of leaves, stipules, internodes of the lower part of the stem and the first node of the inflorescence, sepals, petals, and capsule are practically the same. Yet the species separate at once upon examination of the seed-characters. The seeds of *S. pazensis* are black or nearly so, 0.8–1 mm. long, pyriform in outline, covered with large, black, hardened papillae, and surrounded by a wing 0.3–0.4 mm. wide. *S. ramosa* has light brown, non-sculptured seeds, rounded in outline, 0.7–0.8 mm. long, with a wing usually 0.4–0.6 mm. wide, and sometimes with light brown papillae. There are no transitions between these two easily recognizable types of seeds. In addition, the length of the inflorescence of *S. pazensis* is often much greater and the pedicels much longer than those of *S. ramosa*. The lower internodes of *S. pazensis* are generally longer than those in the majority of the collections of *S. ramosa*. Even though these latter differences are only ones of degree, *S. pazensis* has generally a more lax, sprawling habit.

[1] Britt. Bull. Torr. Bot. Club, xvi. (Enum. Pl. coll. Rusby in So. America 1885–1886), 62 (1889).

Examination of Bolivian collections of *S. ramosa, q. v.* shows a tendency toward this sprawling, open habit seen in the following collections: Cochabamba, *Kuntze*, March 26, 1892; Cochabamba, *Bro. Julio II* 262; Cochabamba, *Parodi* 10193; Ceritos, *Lillo* 4007. However, collections from Sorata, *Williams* 1541 and *Mandon* 946, are more characteristic of *S. ramosa.* It is interesting to note that the following collections of *S. pazensis* because of either short, compact inflorescences or short internodes below (or both) show a tendency toward *S. ramosa:* La Paz, *Troll* 4342; La Paz, *Herzog* 2451; part of Talca Chugiaguillo, *Bang* 814; Tarija, *Fiebrig* 2793; La Paz, *Buchtien* 547.

40. S. RUPESTRIS Camb. (PLATE 596, FIGS. 3a–3c and MAP 34). Perennial, glandular-pubescent throughout: *caudex* bearing 1–? stems, 20–30 cm. tall; *internodes of stem below the inflorescence* 5–15 mm. long, 0.6–1.4 mm. in diameter: *leaves filiform,* densely glandular-pubescent, very strongly mucronate, *fascicled,* 10–25 mm. long, 0.3–0.5 mm. wide; *stipules* broadly lanceolate, *very large and persistent on the old stems,* acuminate, 4–8 mm. long: *inflorescence* a few-flowered, lax cyme, *internodes* 6–11 mm. long, densely glandular-pubescent; *bracts* foliaceous below, becoming minute above, 2–10 mm. long: *sepals* linear, acute, densely glandular-pubescent, 5.4–6.4 mm. long; *petals* white, ovate, 4.6–5.8 mm. long, always shorter than the calyx by 0.2–1 mm.; *stamens* 7–10; *styles* 3, united over half way up or separated to the base, 1–1.2 mm. long: *mature capsules* 4.2–6.8 mm. long, equal to or as much as 0.8 mm. shorter or longer than the calyx; *fruiting pedicels* filiform, densely glandular-pubescent, the lowest 8–12 mm. long: *seeds* 0.7–0.8 mm. long, *light brown, rounded in outline, surface smooth or slightly roughened, not sculptured, densely covered with brown papillae, with a narrow scarcely erose wing,* 0.1–0.3 mm. wide, often with a brownish zone next to the seed.—In St. Hilaire, Fl. Bras. ii. 176 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831); not *S. rupestris* Lebel, Rech. Pl. Ile de Manche, 12 (1848);[1] Steud. in Flora, 424 (1856), as to source of name but not as to plants cited, *Bertero* 810 and 58, which are *S. villosa;* Philippi, Anal. Univ. Chile, lxxxi. 771 (1892), as to source of name, not plants which are *S. villosa* (see Steud. above). *Spergula rupestris* (Camb.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum trachyspermum* Kindb. Mon. Lepig. 31, t. ii. fig. 16 (1863), in part,

[1] *Spergularia rupestris* Lebel is an entirely different European plant and no reference is made to Cambessedes' work. Lebel, Revis. du Gen. Spergularia from Mém. Soc. Imper. Sci. Nat. Cherbourg, xiv. 23 (1868), renamed his European plant *S. rupicola.* The following references are synonymous with *S. rupicola* Lebel: *Lepigonum rupestre* (Lebel) Kindb. Synop. Lepig. 8 (1856) and Mon. Lepig. 29 t. ii, fig. 13 (1863), excluding only the citation Montevideo Am. Mer., *Sello* (B.), one of which specimens was marked *L. rupestre* (Lebel) Kindb. 1861 and is really *S. marina* (L.) Griseb., *q. v.*; *Corion rupestre* (Lebel) N. E. Brown in Syme, Engl. Bot. ed. 3. Suppl. 49 (1891); *Alsine rupestris* (Kindb.) Druce in Ann. Scot. Nat. Hist. 221 (1906).

(part of the Montevideo, *Sello*, collections marked *L. villosum*—a synonym according to Kindberg of *L. trachyspermum*—are *S. rupestris*). *Lepigonum trachyspermum* * subsp. *murale* Kindb. Mon. Lepig. 31, t. ii. fig. 17 (1863) in part (including only the right-hand figure with a winged seed and the citation, Montevideo, *Sello*, which specimen was marked *L. murale* by Kindberg, 1861, excluding the left-hand figure and the European plants discussed which are all *S. rupicola* Lebel). *Spergularia villosa* var. α. *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 69, fig. 1 (1872), in part (including the reference *L. murale* Kindb. and the right-hand narrow-winged seed in figure and the part of the description dealing with seeds rarely narrowly winged; the remaining information referring to *S. ramosa, q. v.*); Rohrb. in Linnaea, xxxvii. 238 (1871–73), in part (including the reference *L. murale* Kindb. and citation Pâo de Assucar near Maldonado, *St. Hilaire* and the narrow-winged seeds of description, excluding all the other references and probably all the other citations which all belong with *S. ramosa, q. v.*). *S. villosa* var. γ *rupestris* (Camb.) Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 269, t. 61, fig. 1 (1872), including only the narrow-winged seed in the figure; Rohrb. in Linnaea, xxxvii. 240 (1871–73); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 94 (1901).[1]—SOUTH AMERICA: only in Uruguay, evidently in rocky habitats. URUGUAY: DEPT. MALDONADO: 200–500 m. alt., Sierra Animas, Pan de Azucar, *Herter* 2119, February, 1907 (B.); 0–300 m. alt , Pan de Azucar, *Herter* 2135, February 25, 1907 (B.); 0–300 m. alt., Pirapolis, *Herter* 10436, October 10, 1907 (B., immature); inter saxa, Punta Ballena, *Herter* 652c, December 27, 1931 (G.); Banda Oriental del Uruguay, *St.-Hilaire* 2063?, rochers nus, Bragados and 2141 ter, with no definite locality (Paris, TYPE COLLECTIONS?[2], photo. in G., one label—left-hand—has only *Spergularia rupestris* +[3] probably in Cambessedes' handwriting,[4] the other has the same in the hand of Spach); rochers nus, Bragados, *St. Hilaire* 2063 ter (B., marked *Lepigonum arenarium* Kindb. 1861). DEPT. MONTEVIDEO: Montevideo, *Sello* d.2[5] (also R. v. Campos-Victoria) (B. 2 sheets; K., probably d.21, only part of the plants on each sheet); Montevideo, *Sello* d394 (B., 3 sheets,[6] one marked *L. murale* Kindb. 1861 and *Spergularia villosa* (Pers.) Camb. by Rohrbach). BRAZIL:

[1] *Buda rupestris* F. Hanb. Lond. Cat. Pl. ed. 9, 12 (1895), *nomen nudum*.

[2] The type locality given in St. Hilaire, Fl. Bras. ii. 176 (1829) is: cracks of rocks at base of Mt. Pâo de Assucar not far from the city Maldonado "in parte orientali provinciae Cisplatinae"; this evidently does not appear upon any specimens located at the Paris Museum. Photo. and data by courtesy of Mr. C. A. Weatherby.

[3] The + may be used for the same reason as the dagger (†) used after new species in St. Hilaire, Fl. Brasiliensis.

[4] Fide Mr. C. A. Weatherby.

[5] Locality found more definitely from Urban, in Engler, Bot. Jahrb. xvii. 177 (1863), *Sello*—"d. 1–740 im südlichen Teile von Uruguay (1821–22)."

[6] Cited under *Lepigonum trachyspermum* subsp. *murale* Kindb., Mon. Lepig. 31, t. 2, fig. 17 (1863) and cited under *S. villosa* var. α. *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268 (1872).

no locality, *Sello* (Leiden, probably the same as one of the Montevideo (*Sello*) collections).

This species is easily confused with *S. villosa* in general habit but differs from it in having longer sepals, a longer style, and larger, light brown, narrowly winged seeds. It is more easily confused with *S. fimbriata* of the Canary Is. but differs in having white instead of rosy petals, densely glandular-pubescent instead of smooth or nearly smooth leaves and light brown seeds with entire-margined wing, smooth surface, and widely spaced papillae, as opposed to black seeds with fimbriate wing, strongly pebbled surface and more minute, crowded papillae. The two species are similar in length of sepals, capsules, stipules, and size of seed.

Rare Exotics

S. Dillenii Lebel (probably). Like *S. marina* except that the seeds are often more reddish-brown, tinged with silver, more densely papillose, and with a more roughened surface.—Revis. Gen. Spergularia in Mém. Sci. Nat. Cherb. xiv. 43 (1868).—South America: introduced from Europe into Chile. Chile: Prov. Talca: Ilico, *Barros* 268, October 19, 1938 (G.). Prov. Santiago: 500 m., Batuco, *Looser* 3452 (G., Cal. Acad.) and 3450 (G.), October 3, 1936; Batuco, *Looser* 3455, November 8, 1937 (G.); Batuco, *Philippi* 1864 (G.). Prov. Coquimbo: Ovalle, *Claude-Joseph* 5196, October, 1927 (U. S.); Ovalle, *Barros* 247, September 22, 1927 (G.); La Serena, Punta de Teatinos, *Werdermann* 874, November, 1925 (G., U. S., N. Y., Cal. Acad., B., F. M.).

I am indebted to Dr. Eugène Simon of Tours, France for this identification. Dr. Simon says of the collections, *Werdermann* 874, and *Looser* 3452, "ne sont pas exactement le *Dillenii*, mais j'estime qu'ils doivent lui être rattachés."

Since the author has been able to gain only a cursory knowledge of European species, all that can be done is to mention again the similarity of this plant to *S. marina* and to wonder what its relationships are in its native home.

S. ? A heavy, large-flowered, glandular-pubescent perennial: *leaves* fascicled; *stipules* broadly lanceolate-acuminate, 4–5 mm. long: *sepals* heavily glandular-pubescent, 5–6.6 mm. long; petals white, 6 mm. long: *mature capsules* very large, 6–8 mm. long: *seeds* dark brown, nearly black, with a silvery tinge, deeply sculptured in areolar, vermiform pattern, covered with widely spaced, hard, black papillae or not, 0.7–0.8 mm. long, surrounded by a white, scarious wing, 0.1–0.2 mm. broad.—South America: introduced perhaps from Australia to the coast of Chile. Chile: Prov. Aconcagua: Valparaiso,

Jaffuel 948, October, 1910 (G.); Algarrobo, Punta de Talca, *Barros* 265, January, 1914 (G.); Prov. Aconcagua, *Philippi*, 1862 (B.). PROV. SANTIAGO: San Antonio, *Claude-Joseph* 297, November, 1924 (U. S.). PROV. ? : Costa, *Claude-Joseph* 1229, November 4, 1920 (U. S.).

It is probable that these plants are introduced because they occur only in ports in central Chile. However, among the meagre collections of foreign Spergularias which I have been able to see, one from South Australia: Port Adelaide, roadside, *Mrs. Sabine Helms* 21, Oct. 1928 (U. C.) seems a fair match; but it may be introduced there also. At present, nothing definite can be said as to a name for these plants. It can be said that they are distinctly different from *S. rupicola* and *S. media* of Europe in type of seeds but similar in habit.

DOUBTFUL NAMES

Lepigonum chilense Fisch. & Meyer, Ind. Sem. Hort. Petr. iii. 14 (1837), *nomen nudum.*

Melargyra purpurea Rafinesque, Fl. Tellur. iii. 81 (1836), *nomen nudum.*

Melargyra rosea Rafinesque, l. c. The description given might fit any rose-flowered *Spergularia* of the region. Type not found.

Spergularia araucana Philippi in Anal. Univ. Chil. lxxxi. 764 (1892). Type not found in Museo Nacional, Santiago, Chile.

Spergularia cerastiodes Foucaud mss. ex H. Ross in Oesterr. Botan. Zeitschr. lvii. 451 (1907), based on a collection from Corral, Chile, *H. Krause* in Herb. München, which I have not seen. No description given.

Spergularia oligantha Philippi in Anal. Univ. Chil. lxxxi. 770 (1892). Type not found in Museo Nacional, Santiago, Chile.

EXCLUDED SPECIES

Spergularia arvensis Camb. in St. Hil. Fl. Bras. Mer. ii. 179 (1829), is *Spergula arvensis* L.

Spergularia leptophylla G. Don, Gen. Hist. Dichl. Pl. 425 (1831), based upon *Arenaria leptophylla* Cham. & Schlecht. in Linnaea, v. 233 (1830).

Lepigonum molluginеum Kindb. Synop. Lepig. 11 (1856), based upon *Alsine mollugineа* Lagasca, Gen. et Spec. 13, no. 170 (1815), which is a *Drymaria.*

Lepigonum paradoxum Kindb. Synop. Lepig. 15 (1856), based upon *Arenaria paradoxa* Bartl. ex Presl, Rel. Haenk. ii. 15 (1831), which certainly is not a *Spergularia.*

Tissa alsinella Greene ex C. F. Baker, West. Am. Plants, ii. 18 (1903), *nomen nudum.* Plant cited is not a *Spergularia.*

Spergularia squarrosa Muschler in Engl. Bot. Jahrb. xlv. 461 (1911); Macbride, Field Mus. Pub. Bot. xiii. pt. 2, 632 (1937); both based upon *Weberbauer* 57 (B., photo. in F. M., G.) which is a *Drymaria*.

Explanation of Plates 589–596

Plate 589. Spergularia macrotheca: fig. 1a, sepals with capsule, × 5, from the Presidio, San Francisco, California, *Heller* 5700; fig. 1b, seed, × 25, from 5700; fig. 1c, style, × 5, from Monterey, California, *Elmer* 4387.

S. macrotheca var. leucantha: fig. 1d, style, × 5, from San Bernardino, California, *S. B. Parish* 4755.

S. macrotheca var. longistyla: fig. 1e, seed, × 25, from the type, from near Altamont, Alameda Co., California, *G. B. & R. P. Rossbach* 611; fig. 1f, style, × 5, from 611.

S. canadensis: fig. 2a, sepals with capsule, × 5, from Lower Argyle, Yarmouth Co., Nova Scotia, *Fernald et al.* 21189; fig. 2b, a non-papillose seed, × 25, from Bathurst, New Brunswick, *Blake*, August 13, 1913; fig. 2c, a papillose seed, × 25, from capsule of *Fernald* 21189; fig. 2d, stipule, × 5, from same plant as fig. 2b.

S. atrosperma: fig. 3a, sepals with capsule, × 5, from the type, from Los Banos Hills, Merced Co., California, *J. T. Howell* 13826; fig. 3b, seed, × 25, from type; fig. 3c, stipule, × 5, from type.

S. mexicana: fig. 4a, sepals with capsule, × 5, from Pachuca, Hidalgo, Mexico, *Pringle* 6913; fig. 4b, stipule, × 5, from 6913; fig. 4c, seed, × 25, from 6913.

S. diandra: fig. 5a, sepals with capsule, × 5, from Hayden Island in the Columbia River, Oregon, *J. C. Nelson* 2958; fig. 5b, seed, × 25, from 2958; fig. 5c, stipule, × 5, from 2958.

S. rubra: fig. 6a, sepals with capsule, × 5, from Martha's Vineyard Island, Massachusetts, *F. C. Seymour* 1198; fig. 6b, seed, × 25, from 1198; fig. 6c, stipule, × 5, from 1198.

S. Bocconi: fig. 7a, sepals with capsule, × 5, from Pacific Grove, Monterey Co., California, *Heller* 6797; fig. 7b, seed, × 25, from 6797; fig. 7c, stipule, × 5, from 6797.

Plate 590. S. media: fig. 1a, sepals with capsule, × 5, from Syracuse, New York, *Wiegand* 6409; fig. 1b, stipule, × 5, from 6409; fig. 1c, seed, × 25, from 6409.

S. echinosperma: fig. 2a, sepals with capsule, × 5, from Corpus Christi, Texas, *Benke* 5360; fig. 2b, seed, × 25, from Pecos, Texas, *E. J. Palmer* 34027; fig. 2c, stipule, × 5, from 34027.

S. marina: fig. 3a, sepals with capsule, × 5, from Aliso Canyon, Laguna Beach, Orange Co., California, *D. L. Crawford*, July 26, 1916; fig. 3b, papillose seed, × 25, from same plant as fig. 3a; fig. 3c, smooth seed, × 25, from Balboa, Orange Co., California, *Abrams* 6565; fig. 3d, seed with a few scattered papillae, × 25, from Tracadie, Gloucester Co., New Brunswick, *Blake* 5648; fig. 3e, stipule, × 5, from same plant as fig. 3a.

S. congestifolia: fig. 4a, sepals with a nearly mature capsule, × 5, from the type, from Mollendo, Prov. Islay, Peru, *I. M. Johnston* 3567; fig. 4b, stipule, × 5, from type.

S. arbuscula: fig. 5a, long blunt sepals with hidden capsule, × 5, from Limari, Frai Jorge, Prov. Coquimbo, Chile, *Werderman* 894; fig. 5b, short, reflexed, acute sepals with capsule, × 5, from vicinity of Aguada de Miguel Diaz, Prov. Antofagasta, Chile, *I. M. Johnston* 5357; fig. 5c, short, broad sepals with capsule, × 5, from just north of Caldera, Prov. Atacama, Chile, *I. M. Johnston* 5066; fig. 5d, seed, × 25, from 5066; fig. 5e, stipule, × 5, from Puerto de Chañaral, Prov. Atacama, Chile, *I. M. Johnston*, 4753.

Plate 591. The type of "*Arenaria foliis linearibus longitudine internodiorum*" Linn. Hort. Cliff.; therefore the type of *Arenaria rubra β. marina*

L. Sp. Pl. (see discussion of *S. marina*). From the Clifford Herbarium at the British Museum by the courtesy of Mr. J. RAMSBOTTOM.

PLATE 592. The plant cited as the basis for "*Arenaria foliis longitudine internodiorum*" Gronovius, Fl. Virg., which is a synonym of *Arenaria rubra β. marina* L. Sp. Pl. (see discussion of *S. marina*). From the Clayton Herbarium at the British Museum by the courtesy of MR. J. RAMSBOTTOM.

PLATE 593. S. FASCICULATA: FIG. 1a, sepals with capsule, × 5, from Arequipa, Dept. Arequipa, Peru, *G. H. H. Tate* 1197; FIG. 1b, seed, × 25, from 25-2600 m. alt. above Arequipa, Dept. Arequipa, Peru, *Pennell;* FIG. 1c, stipule, × 5, from *Tate* 1197; FIG. 1d, style, × 5, from same plant as FIG. 1b.

S. ANDINA: FIG. 2a, sepals with capsule, × 5, from TYPE, from Azangaro, Dept. Puno, Peru, *Lechler* 1772; FIG. 2b, seed, × 25, also from Azangaro, *Weberbauer* 456; FIG. 2c, stipule, × 5, from same plant as fig. 2a.

S. DEPAUPERATA: FIG. 3a, sepals with capsule, × 5, from TYPE COLLECTION from Chile, *Gay;* FIG. 3b, seed, × 25, from the cordillera of Chillan, Prov. Nuble, Chile, *Felsen* 142; FIG. 3c, stipule, × 5, from Gay.

S. PISSISI: FIG. 4a, sepals with capsule, × 5, from Quebrada Alfalfa, Prov. Atacama, Chile, *I. M. Johnston* 5985; FIG. 4b, seed, × 25, from Banos del Toro, Prov. Coquimbo, Chile, *Espinosa*, February 26, 1938; FIG. 4c, stipule, × 5, from 5958.

S. CREMNOPHILA: FIG. 5a, sepals with capsule, × 5, from TYPE, from Aguada Cachina, Prov. Antofagasta, Chile, *I. M. Johnston* 5683; FIG. 5b, a dull, sculptured seed, × 25, from 5683; FIG. 5c, a lustrous, smooth seed, × 25, from near Aguada Grande, Prov. Antofagasta, Chile, *I. M. Johnston* 5821; FIG. 5d, stipule, × 5, from 5683; FIG. 5e, stipule, × 5, from 5821.

PLATE 594. S. ABERRANS: FIG. 1a, sepals with capsule, × 5, from Antofagasta, Chile, *Jaffuel* 1136; FIG. 1b, seed, × 25, from TYPE, from Antofagasta, Chile, *I. M. Johnston;* FIG. 1c, stipule, × 5, from TYPE.

S. STENOCARPA: FIG. 2a, sepals with capsule, × 5, from between Quebrada San Ramon and Paso Malo, Prov. Antofagasta, Chile, *I. M. Johnston* 5177; FIG. 2b, seed, × 25, from vicinity of Paposo, Prov. Antofagasta, Chile, *I. M. Johnston* 5604; FIG. 2c, seed, × 25, from vicinity of Taltal, Prov. Antofagasta, Chile, *I. M. Johnston* 5162; FIG. 2d, stipule, × 5, from 5177.

S. DENTICULATA: FIG. 3a, sepals with capsule, × 5, from Aguada Grande, Prov. Antofagasta, Chile, *I. M. Johnston* 5822; FIG. 3b, seed, × 25, from 5822; FIG. 3c, stipule, × 5, from 5822.

S. CERVIANA: FIG. 4a, sepals with capsule, × 5, from TYPE, from Talcaguano, Prov. Concepcion, Chile, *Chamisso;* FIG. 4b, sepals with capsule, × 5, from Antuco, Prov. Nuble, Chile, *Pöppig* 125; FIG. 4c, seed, × 25, from 125; FIG. 4d, stipule, × 5, from TYPE, *Chamisso.*

S. FLORIBUNDA: FIG. 5a, sepals with capsule, × 5, from the TYPE COLLECTION, from vicinity of La Serena, Prov. Coquimbo, Chile, *Gay;* FIG. 5b, seed, × 25, from TYPE COLLECTION, *Gay;* FIG. 5c, stipule, × 5, from TYPE COLLECTION, *Gay.*

S. PYCNANTHA: FIG. 6a, sepals with capsule, × 5, from the TYPE, from Huasco, Prov. Atacama, Chile, *Jaffuel* 1164; FIG. 6b, seed, × 25, from TYPE; FIG. 6c, stipule, × 5, from TYPE.

S. VILLOSA: FIG. 7a, sepals with capsule, × 5, from Pangal, Limache, Prov. Valparaiso, Chile, *G. Looser*, October 12, 1926; FIG. 7b, a non-papillose seed, × 25, from Arauco, Prov. Arauco, Chile, *Pennell* 12933; FIG. 7c, a papillose seed, × 25, from Campana, Prov. Buenos Aires, Argentina, *Parodi* 8608; FIG. 7d, stipule, × 5, from same plant as FIG. 7a.

S. CONFERTIFLORA: FIG. 8a, sepals with capsule, × 5, from the TYPE COLLECTION, from Juan Fernandez Islands, Chile, *Bertero* 1431; FIG. 8b, seed, × 25, from 1431; FIG. 8c, stipule, × 5, from 1431.

PLATE 595. S. RAMOSA: FIG. 1a, sepals with capsule, × 5, from Tumbaya, Prov. Jujuy, Argentina, *Venturi* 4900; FIG. 1b, papillose seed, × 25, from Santa Lucia, Dept. San José, Uruguay, *Osten* 21691; FIG. 1c, a smooth seed,

× 25, from Campana, Prov. Buenos Aires, Argentina, *Parodi* 11326; FIG. 1d, stipule, × 5, from 21691.

S. RAMOSA var. DIFFUSA: FIG. 1e, seed, × 25, from the TYPE, from Burruyacu, Prov. Tucuman, Argentina, *Venturi* 7722; FIG. 1f, sepals with capsule, × 5, from TYPE; FIG. 1g, stipule, × 5, from TYPE.

S. SPRUCEANA: FIG. 2a, sepals with capsule, × 5, from the TYPE, from the Andes of Ecuador, *Spruce* 5444; FIG. 2b, seed, × 25, from TYPE; FIG. 2c, stipule, × 5, from TYPE.

S. PLATENSIS: FIG. 3a, sepals with capsule, × 5. from Los Angeles, California, *Parry* 15, 1881; FIG. 3b, a papillose seed, × 25, from 15; FIG. 3c, a non-papillose seed, × 25, from Otay, Riverside Co., California, *Orcutt* 1201; FIG. 3d, stipule, × 5, from Rio Sali, Prov. Tucuman, Argentina, *Venturi* 1908.

S. PLATENSIS var. BALANSAE: FIG. 3e, sepals with capsule, × 5, from TYPE, from Paraguay, *Balansa* 2271; FIG. 3f, stipule, × 5, from TYPE.

S. COLLINA: FIG. 4a, sepals with capsule, × 5, from Mollendo, Prov. Islay, Peru, *A. S. Hitchcock* 22355; FIG. 4b, seed, × 25, from 22355; FIG. 4c, stipule, × 5, from 22355.

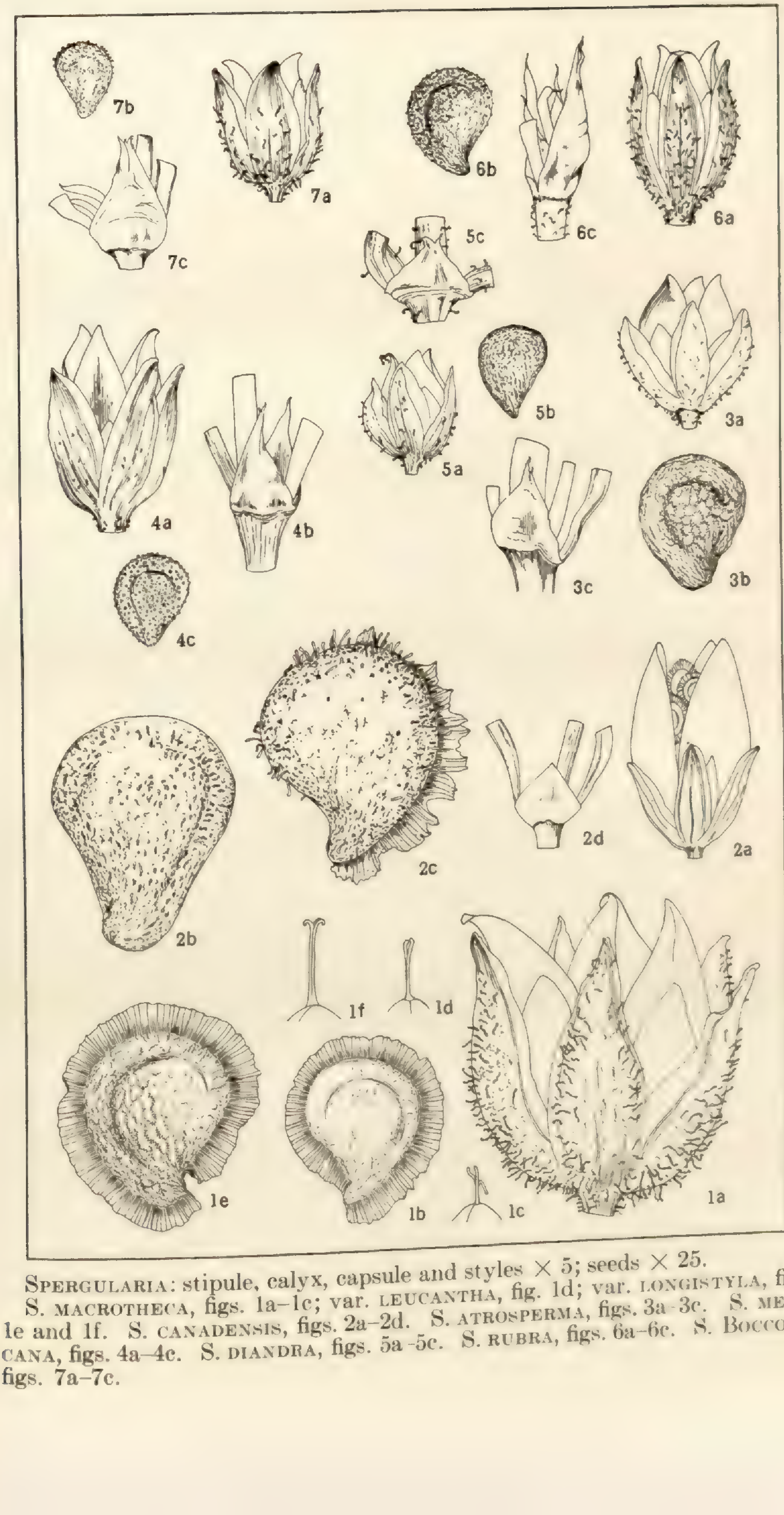
PLATE 596. S. GRANDIS: FIG. 1a, sepals with capsule, × 5, from San Jose, Prov. Santa Catharina, Brazil, *Ule* 472; FIG. 1b, seed, × 25, from 472; FIG. 1c, stipule, × 5, from 472.

S. LEVIS: FIG. 2a, sepals with capsule, × 5, from Montevideo, Uruguay, *Sello*, October 22; FIG. 2b, seed, × 25, from Concepcion del Uruguay, Prov. Entre Rios, Argentina, *Lorentz*, October, 1875; FIG. 2c, stipule, × 5, from Montevideo, Uruguay, *Gibert*, October, 1858.

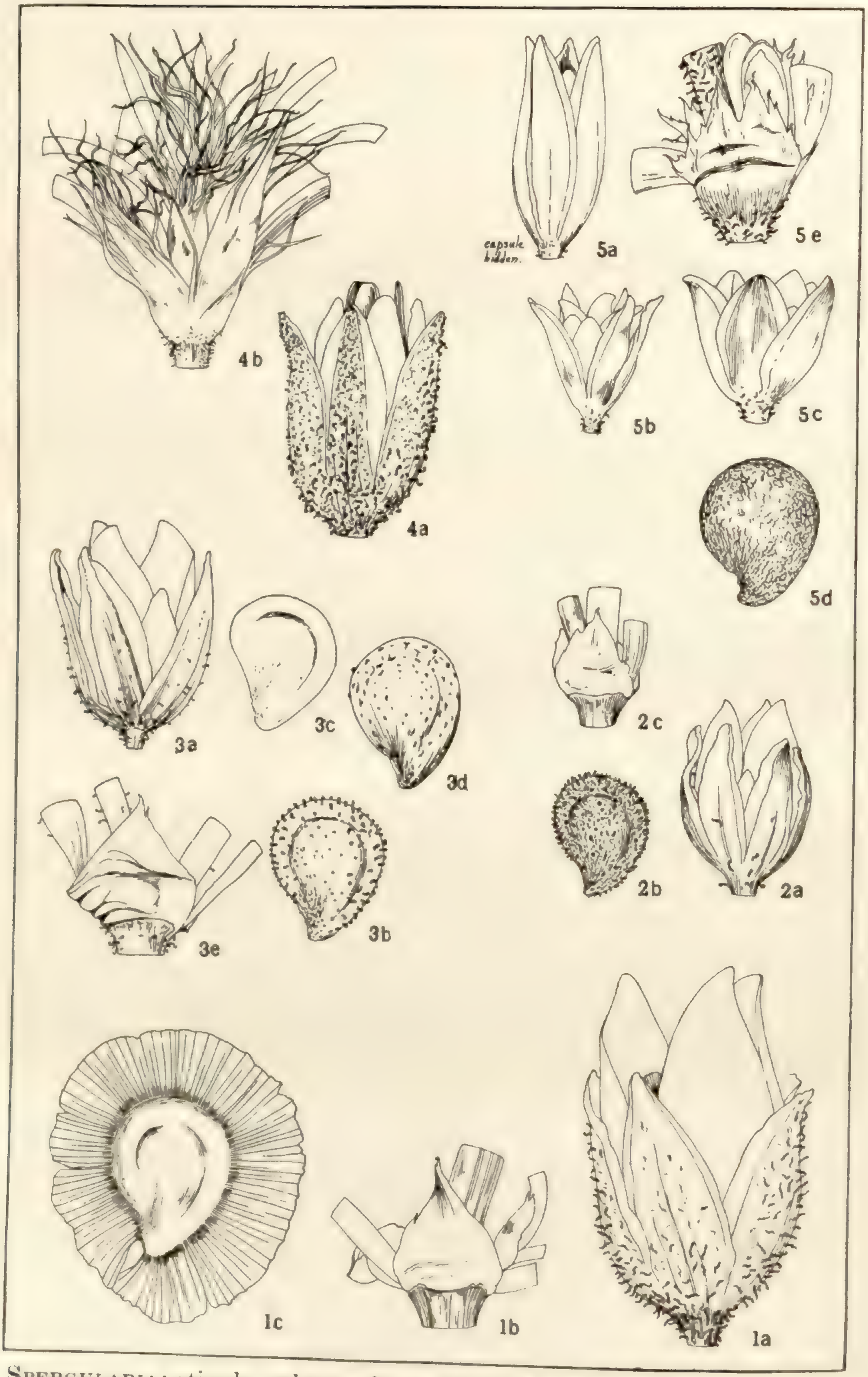
S. RUPESTRIS: FIG. 3a, sepals with capsule, × 5, from Montevideo, Uruguay, *Sello* d394; FIG. 3b, seed, × 25, from 394; FIG. 3c, stipule, × 5, from 394.

S. COLOMBIANA: FIG. 4a, sepals with capsule, × 5, from the TYPE, from Prov. Bogota, Colombia, *Triana*, 1851–1857; FIG. 4b, stipule, × 5, from the TYPE.

S. PAZENSIS: FIG. 5a, sepals with capsule, × 5, from Talca Chugiaguillo, Dept. La Paz, Bolivia, *Bang* 814; FIG. 5b, seed, × 25, from 814; FIG. 5c, stipule, × 5, from La Paz, Bolivia, *R. S. Williams* 2336.



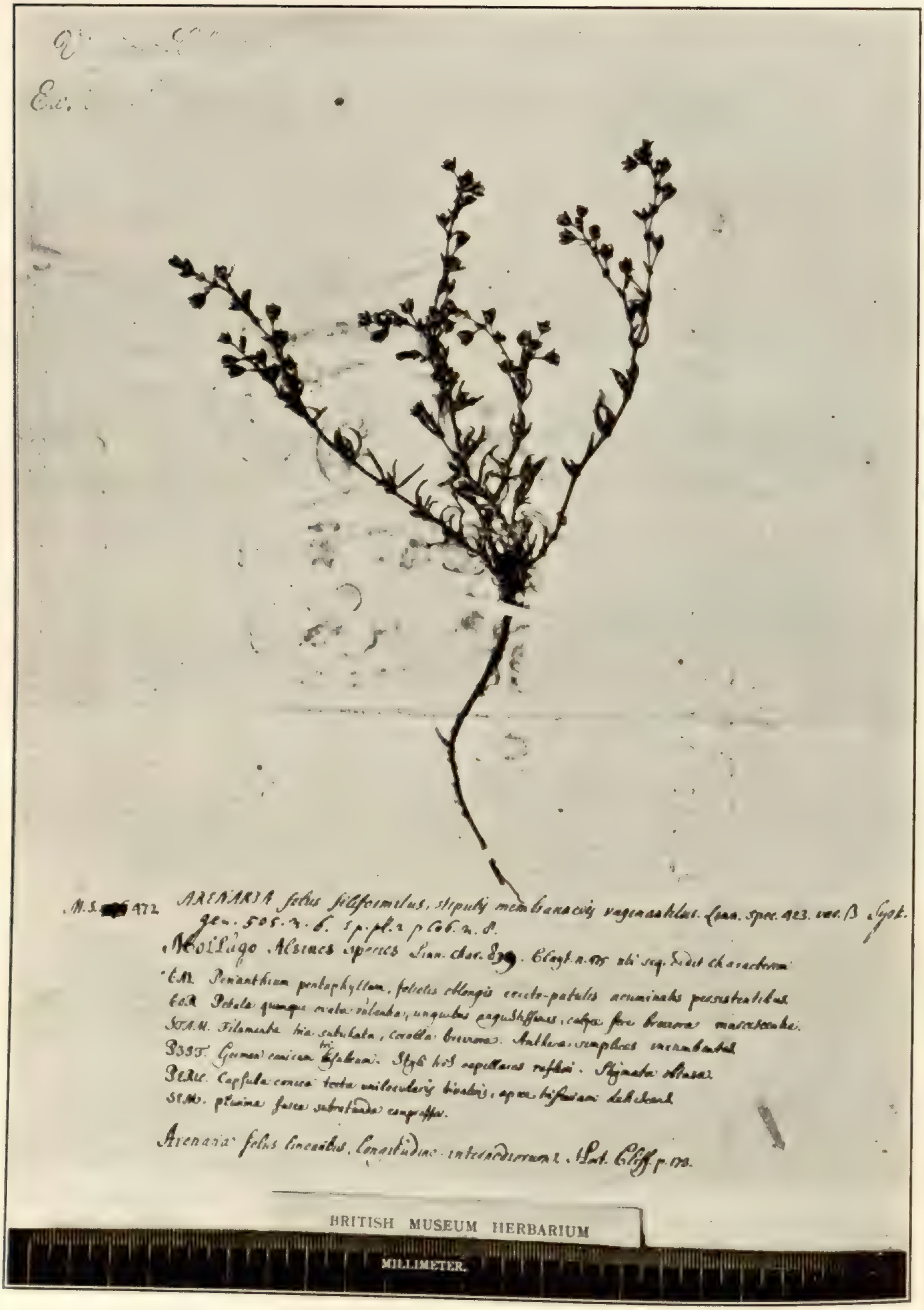
Spergularia: stipule, calyx, capsule and styles × 5; seeds × 25.
S. macrotheca, figs. 1a–1c; var. leucantha, fig. 1d; var. longistyla, figs. 1e and 1f. S. canadensis, figs. 2a–2d. S. atrosperma, figs. 3a–3c. S. mexicana, figs. 4a–4c. S. diandra, figs. 5a–5c. S. rubra, figs. 6a–6c. S. Bocconi, figs. 7a–7c.



SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.
S. MEDIA, figs. 1a–1c. S. ECHINOSPERMA, figs. 2a–2c. S. MARINA, figs. 3a–3e. S. CONGESTIFOLIA, figs. 4a and 4b. S. ARBUSCULA, figs. 5a–5e.

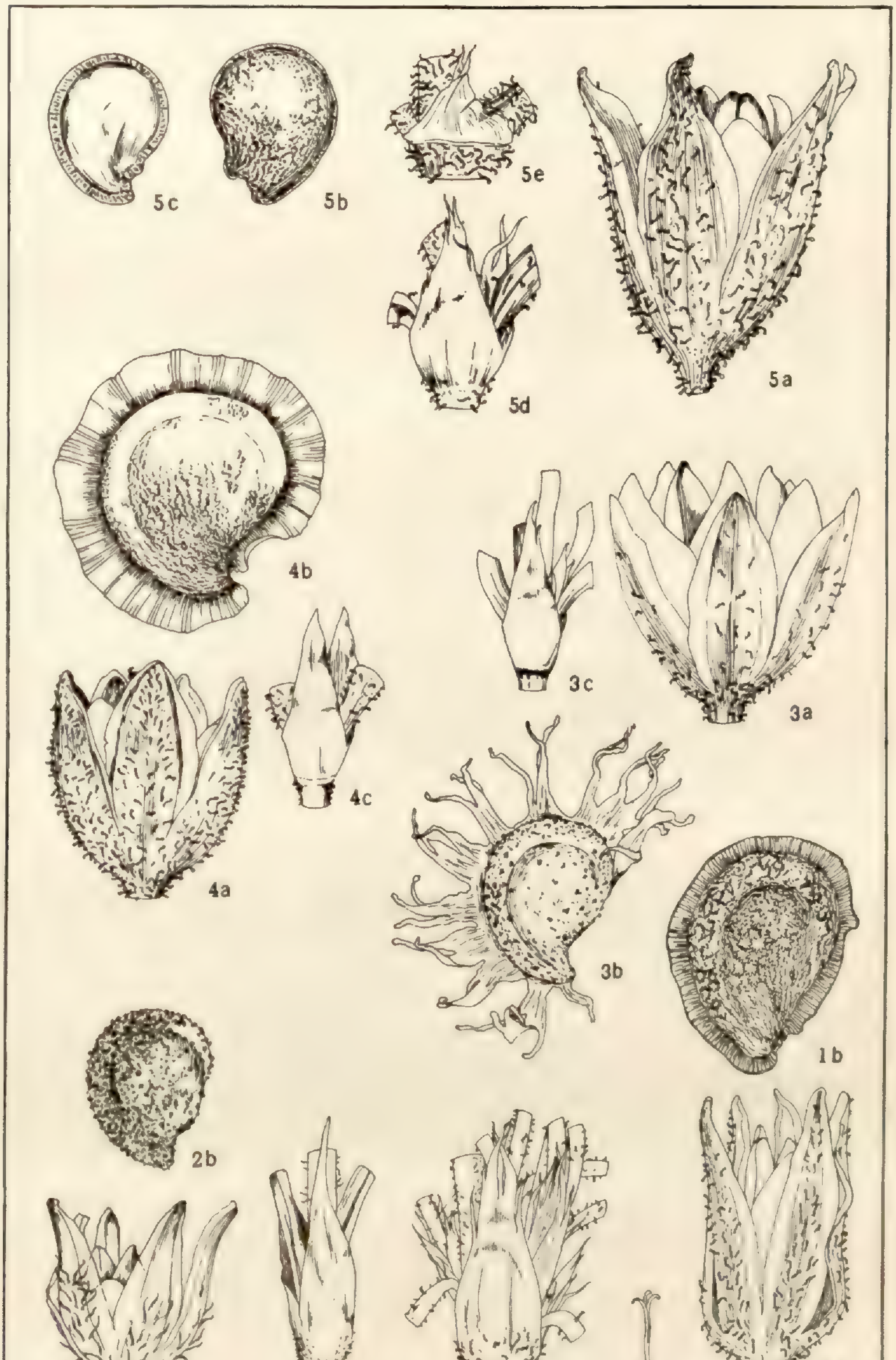
Type of Arenaria rubra β. marina L.

Photograph of *Arenaria foliis linearibus longitudine internodiorum* of Linnaeus, Hort. Cliff., by courtesy of Mr. John Ramsbottom.

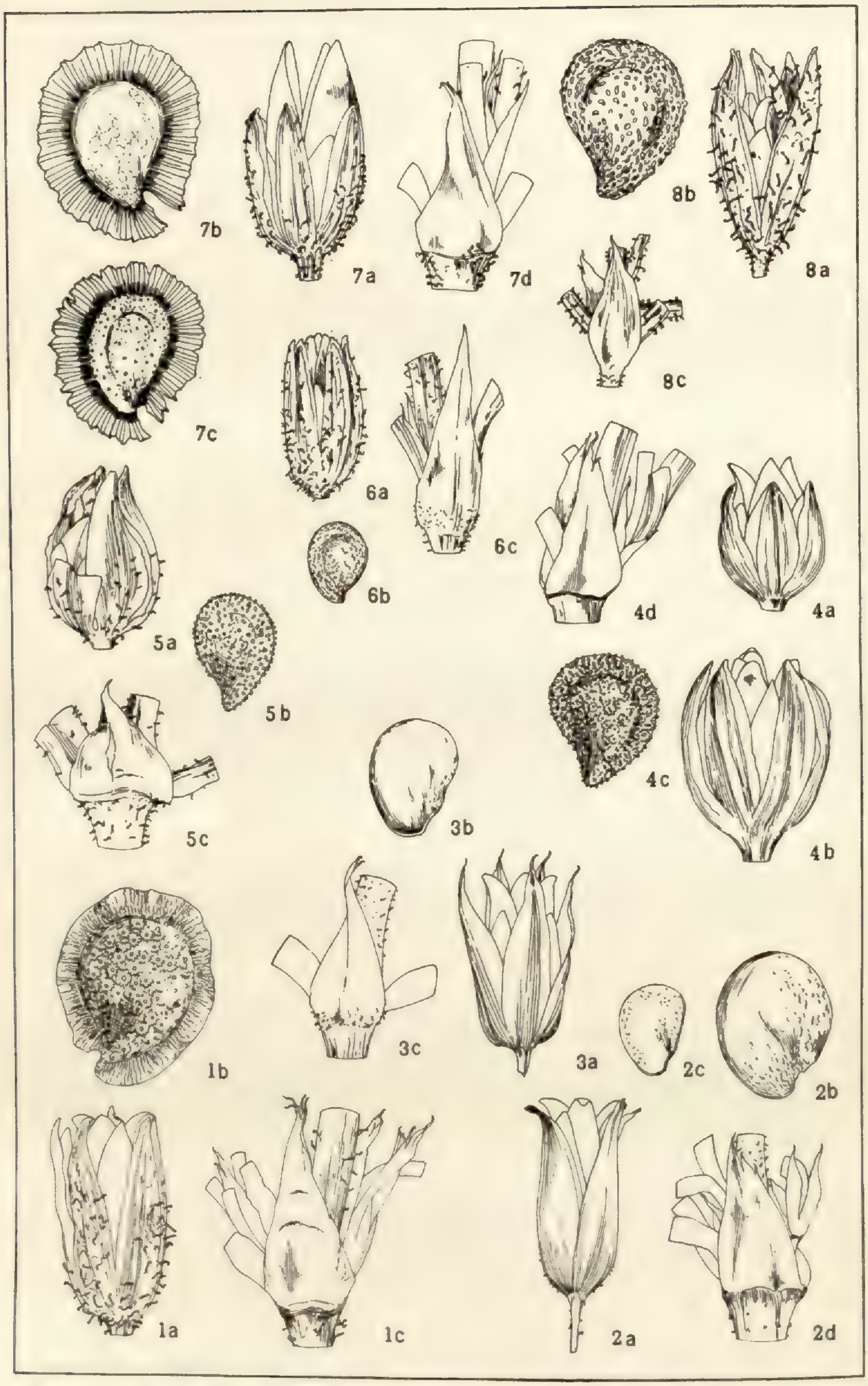


ARENARIA RUBRA β. MARINA L.

Clayton's 475, the basis of the Gronovian reference given by Linnaeus; photograph by courtesy of Mr. JOHN RAMSBOTTOM.

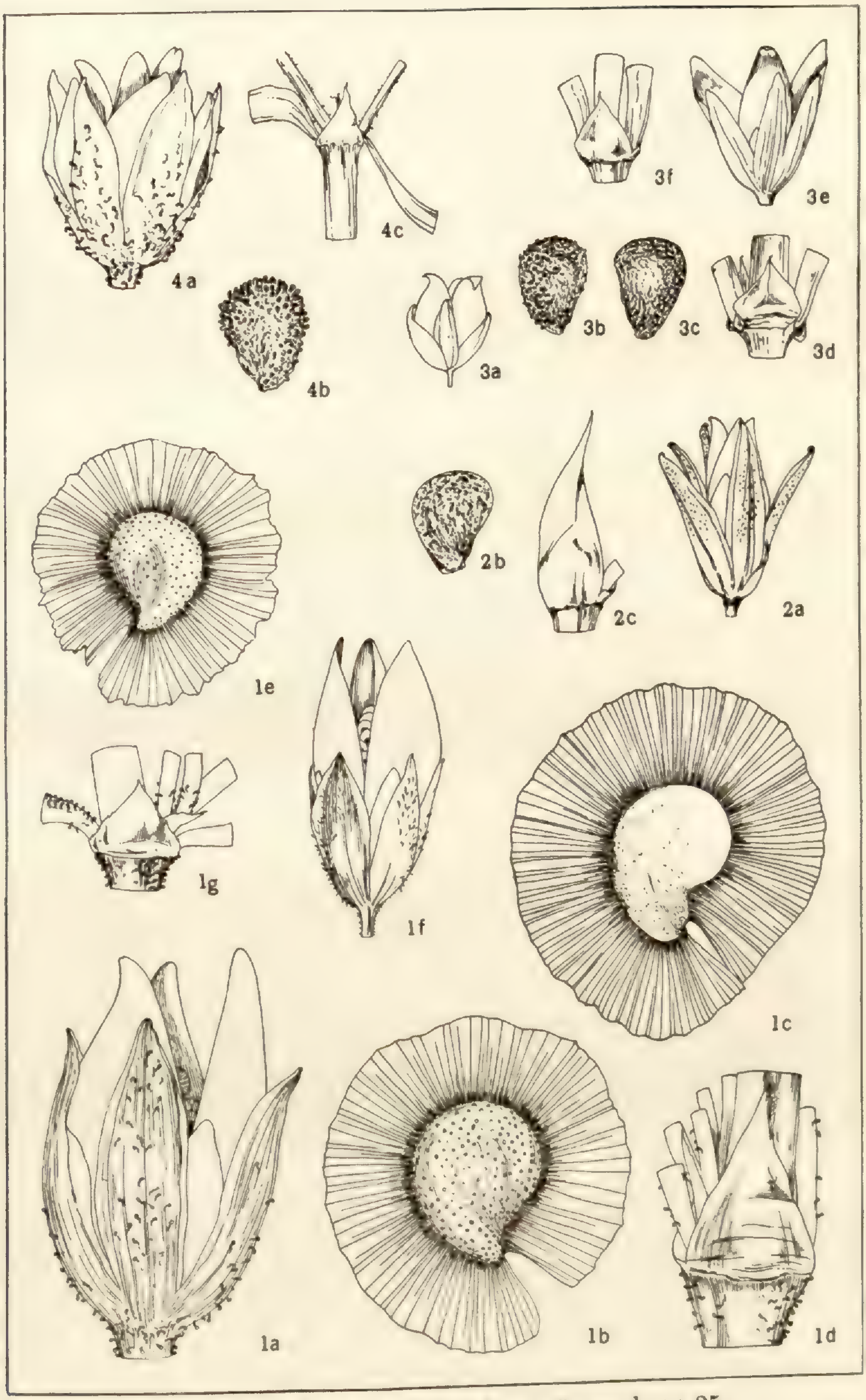


SPERGULARIA: stipule, calyx, capsule and style × 5; seeds × 25. S. DEPAUPERATA, figs. 1a–1d. S. ANDINA, figs. 2a–2c. S. FASCICULATA, figs. 3a–3c. S. PISSISI, figs. 4a–4c. S. CREMNOPHILA, figs. 5a–5e.

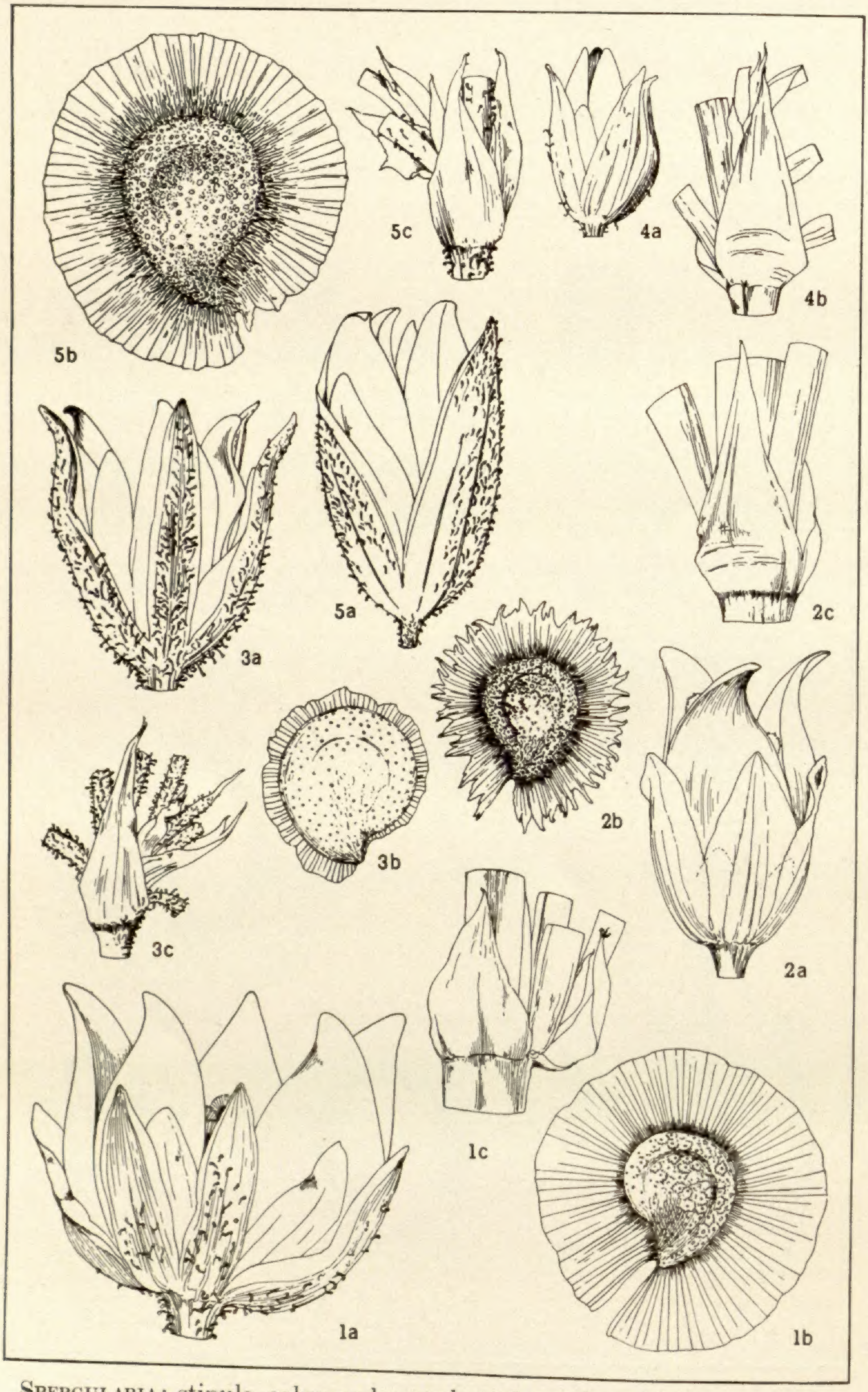


SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.

S. ABERRANS, figs. 1a–1c. S. STENOCARPA, figs. 2a–2d. S. DENTICULATA, figs. 3a–3c. S. CERVIANA, figs. 4a–4d. S. FLORIBUNDA, figs. 5a–5c. S. PYCNANTHA, figs. 6a–6c. S. VILLOSA, figs. 7a–7d. S. CONFERTIFLORA, figs. 8a–8c.



SPERGULARIA: stipule, calyx and capsule, × 5; seeds × 25.
S. RAMOSA, figs. 1a–1d; var. DIFFUSA, figs. 1e–1g. S. SPRUCEANA, figs. 2a–2c. S. PLATENSIS, figs. 3a–3d; var. BALANSAE, figs. 3e and 3f. S. COLLINA, figs. 4a–4c.



SPERGULARIA: stipule, calyx and capsule × 5; seeds × 25.
S. GRANDIS, figs. 1a–1c. S. LEVIS, figs. 2a–2c. S. RUPESTRIS, figs. 3a–3c. S. COLOMBIANA, figs. 4a and 4b. S. PAZENSIS, figs. 5a–5c.

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